BRITISH DENTAL JOURNAL

VOL. XC, No. 7 APRIL 3, 1951

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April 3, 1951

BRITISH DENTAL JOURNAL

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CONTENTS

Original Communications PAGE

Organic Constituents of Dentine. By MAURICE V. STACK, M.Sc. 173

Some Therapeutic Agents and their Uses in the Public Dental Service. By E. DAVIES-THOMAS, *T.D.*, L.R.C.P.Lond., M.R.C.S., L.D.S.Eng. 181

Short Communications

Chondrosarcoma of the Maxilla. By Professor P. J. STOY, B.D.S., F.D.S. R.C.S.Eng. 188

Treatment of Diastema by Jacket Crowns. By ADRIAN COWAN, M.B., B.Ch., B.Dent.Sc.Dubl., F.D.S. R.C.S.Eng. 189

Orthodontic Note

Some Considerations on the Diagnosis of Malocclusion Relative to Extraction 189

Editorial

Dental Goods 190

Continued overleaf

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CONTENTS—*continued*

Notes and Comments	PAGE
The Salaries Settlement	191
Retirement of Sir William Douglas	191
New Dental Schools	191
The Lindsay Portrait	192
Benevolent Fund Legacy	192
Fifty Years Ago	192
Letters to the Editor	
The Role of Salivary Ammonia in Dental Caries (G. Neil Jenkins, Donald E. Wright)	192
Dental Disease in Parts of Trinidad and British Guiana (J. D. King)	193
Sectional Impressions in Anterior Restorations (R. Portman Graham)	193
Estimation of Collagen in Hard Tissues (M. V. Stack)	194
Reviews and Abstracts	194
The Health Service	196
Salaries of Public Dental Officers	197
Dental News	199
The Schools	199
The Services	200
Our Diary	200
British Dental Journal	200
Supplement	
Association Notices	37
Annual Meeting 1951	37
Branches and Sections	38
Public Dental Officers' Group	38
P.D.O. Group Notes	39
Correspondence	
Conservative Fees ("1920")	39
Changes of Address	39
Candidates for Membership	40
Forthcoming Meetings at Headquarters	40

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CLASSIFIED ADVERTISEMENTS

LECTURES

FACULTY of Dental Surgery (Royal College of Surgeons of England) and Institute of Dental Surgery (University of London). LECTURES in GENERAL, ORAL and DENTAL SURGERY. A series of lectures in General, Oral and Dental Surgery will be held at the College in Lincoln's Inn Fields from April 30 to June 1, 1951, at 5 p.m. and 6.15 p.m. CLINICAL DEMONSTRATIONS. Clinical demonstrations have been arranged to take place during the period of the lectures principally at Whittington Hospital, Highgate Hill, N.19. The clinical course is full time, but arrangements may be made in special cases for students to attend part-time. The fee for the whole course is £26 5s. The fee for the Lecture course is £8 8s. or 10s. for single lectures. Full details of these Courses may be obtained on application to the Secretary, Faculty of Dental Surgery, Royal College of Surgeons of England, Lincoln's Inn Fields, London, W.C.2. Tel: HOLborn 3474. W. F. Davis, Secretary, Faculty of Dental Surgery.

PUBLIC APPOINTMENTS

UNIVERSITY of Belfast. Applications are invited for (1) A LECTURESHIP in DENTAL PROSTHETICS and MECHANICS and (2) A LECTURESHIP in CLINICAL DENTAL SURGERY at the Queen's University of Belfast from October 1, 1951. Salary £1,300 by £50 to £1,750, plus provision for superannuation. Initial placing on the scale is dependent on experience and qualifications. Applications should be received by April 30, 1951. Particulars from G. R. Cowie, M.A., LL.B., Secretary.

UNIVERSITY of Glasgow. LECTURERS in OPERATIVE DENTAL SURGERY. Applications are invited for the following appointments: 1. Lecturer in Operative Dental Surgery. Salary £1,000 to £1,500, according to experience and qualifications; 2. Lecturer in Operative Dental Surgery. Salary £600 to £1,500, according to experience and qualifications. F.S.S.U. and family allowance. Applications (16 copies), together with the names of three referees, should be lodged not later than April 14, 1951, with the undersigned from whom further particulars may be obtained. Robt. T. Hutcheson, Secretary of University Court.

ROYAL Dental Hospital of London School of Dental Surgery (University of London), Leicester Square, W.C.2. Applications are invited for the posts of (a) ASSISTANT DIRECTOR, CONSERVATION DEPARTMENT; six sessions each week, salary £900 x £60—£1,200 p.a., plus F.S.S.U. and f.a.; (b) ASSISTANT DIRECTOR, PROSTHETICS DEPARTMENT; 6 sessions each week, salary £775 x £60—£1,075 p.a., plus F.S.S.U. and f.a.; (c) DEMONSTRATORS in OPERATIVE DENTAL SURGERY, 2—6 sessions; ADVANCED OPERATIVE TECHNIQUE, 3—5 sessions; CHILDREN'S CONSERVATION, 6 sessions; JUNIOR CONSERVATION (Phantom Head Class), 5 sessions; PERIODONTOLOGY, 5 sessions; ORTHODONTICS, 3—5 sessions; PROSTHETICS, 2—6 sessions. Salaries on the scale £210 x £20—£270 p.a. for 2 sessions to £720 x £60—£900 for 6 sessions; (d) DEMONSTRATORS in EXTRACTION; 2 or more sessions each week, salary £1 11s 6d. per session; (e) ASSISTANT PATHOLOGIST in charge of courses in DENTAL HISTOLOGY, £40 per course; (f) ASSISTANT DIRECTOR of TEACHING; 2 sessions each week, salary £260 x £20—£360. Sessions: for Demonstrators in Extraction, 1½ hours; for other appointments, morning sessions commence at 9 a.m., afternoon sessions commence at 2 p.m. Superannuation and family allowance will be granted where applicable. Appointments are tenable from September 1, and are subject to annual election in June. Present holders are eligible for re-election. Candidates, who must possess a registrable dental qualification, should forward 6 copies of their applications, together with the names of 3 referees not later than April 30, 1951, to the Dean.

EASTMAN Dental Hospital and Institute of Dental Surgery (University of London), Gray's Inn Road, W.C.1. Applications are invited for the following posts: (a) REGISTRAR in the DEPARTMENT of ORAL SURGERY. The person appointed will be required to reside in the Royal Free Hospital and, under the direction of the Consultants, will be required to attend to the patients in that Hospital as well as in the Eastman Dental Hospital. Salary £775 or £890 p.a., according to experience. Terms and conditions of service in accordance with M.O.H. Regulations. Application forms can be obtained from the Director to whom application should be made before April 28, 1951. (b) REGISTRAR (non-resident) in the DEPARTMENT of ORAL SURGERY. Salary £775 p.a. or £890 p.a. according to experience. Terms and conditions of service in accordance with M.O.H. Regulations. Application forms can be obtained from the Director to whom application should be made before April 28, 1951. (c) SENIOR REGISTRAR (non-resident) in the DEPARTMENT of ORTHODONTICS. Salary £1,000—£1,300 p.a. according to experience. Terms and conditions of service in accordance with M.O.H. Regulations. Full particulars and application forms obtainable from the Director.

THE UNITED Birmingham Hospitals. A vacancy occurs for an experienced DENTAL SURGEON to assist in the clinical treatment of patients at the Birmingham Dental Hospital under the direction of the Dental Superintendent. Candidates must be prepared to undertake duties in any department of the Hospital. The post, which is superannuable, will be whole-time (non-resident) and the appointee will be graded Senior Hospital Dental Officer. Hours of duty will be 9 a.m. to 5 p.m. on weekdays and 9 a.m. to 12.30 p.m. on Saturdays. Salary and conditions of service will be in accordance with "The Terms and Conditions of Service of Hospital Medical and Dental Staff" (Salary £1,300 p.a. at age 32, rising by annual increments of £50 to £1,750 p.a.). Forms of application, which may be obtained from The Secretary, The United Birmingham Hospitals, Queen Elizabeth Hospital, Edgbaston, Birmingham, should be completed and returned within 21 days of the appearance of this advertisement.

UNIVERSITY of Edinburgh. School of Dental Surgery. Applications are invited for the whole-time post of ASSISTANT in the DEPARTMENT of OPERATIVE DENTAL SURGERY. Grade—Lecturer (Lower Scale). Salary £600 x £100 annually to £1,000 per annum, with children's allowance and superannuation. Applications, stating age, qualifications and experience, together with the names of three referees, should be sent, not later than April 7, 1951, to the Secretary to the University, Old College, South Bridge, Edinburgh. February, 1951.

SOUTHERN RHODESIA Government. DENTAL SURGEON: Department of Health. Applications are invited for the post of qualified Dental Surgeon in the Department of Health, Southern Rhodesia Government. Duties include attendance on children at schools, on members of the B.S.A. Police, Permanent Staff Corps, Prison Officers and other Government patients and entail a considerably amount of travelling for which transport is provided, and subsistence allowance paid. Applicants should preferably be under 35 years of age, and must possess a degree or diploma which is registrable with the Medical Council of Southern Rhodesia. The salary scale will be £750 x £50 to £800 x £100 to £900 x £33 to £1,197 per annum, plus Cost of Living Allowance, allowance of £200 per annum in lieu of Private Practice, and, if applicable, marriage allowance of £50 per annum when salary does not exceed £800 per annum, and children's allowance of £60 per annum for the first child and £24 per annum for each additional child for dependent children under the age of 18 years in the officer's custody. A maximum of four increments may be given on first appointment for approved experience subsequent to qualification, viz: (a) Experience, nil: (b) Salary, £750: (c) Cost of Living Allowance, £130: (d) Marriage Allowance, £50: (e) Private Practice Allowance, £200. Total £1,130 p.a. (a) One year. (b) £800. (c) £141. (d) £50. (e) £200. Total £1,191 p.a. (a) Two years. (b) £900. (c) £146. (d) Nil. (e) £200. Total £1,246 p.a. (a) Three years. (b) £933. (c) £155. (d) Nil. (e) £200. Total £1,288 p.a. (a) Four years. (b) £966. (c) £162. (d) Nil. (e) £200. Total £1,328 p.a. Leave privileges include the grant on full pay of vacation leave (which is cumulative and accrues at 1/8 of service), occasional leave not exceeding six days per annum, and sick leave up to six months (plus six months on half pay) for any one illness. No housing accommodation is provided. Appointment is subject to the rules and regulations of the Southern Rhodesia Civil Service. Applications, in duplicate, giving full details of age, nationality, marital state, qualifications, previous experience, earliest date on which duty could be assumed, together with copies of 3 recent testimonials and the names of two persons to whom reference may be made, should be submitted to the Secretary, Office of the High Commissioner for Southern Rhodesia, Rhodesia House, 429, Strand, London, W.C.2, not later than April 30, 1951. Details of leave conditions, pension scheme, medical examination, Income Tax, refund of sea and rail fares on appointment, etc., may be obtained on application from the High Commissioner's Office. Canvassing will disqualify applicants.

ESSEX County Council. Barking Health Area. Appointment of DENTAL OFFICERS. Applications are invited from Dental Surgeons (male or female) for full-time appointments in connection with the Priority Dental Services. The present scale of remuneration, adjustable upon the introduction of a new national scale, is £835 to £1,000 per annum. It is anticipated that living accommodation will be available for one officer, and this is the subject of negotiation. Experience and qualifications of the successful candidate will determine the commencing point within the scale. In addition to the Priority Service work, facilities may be available, if desired, by arrangement with the local Executive Council for the successful candidates to undertake not more than two evening sessions per week in connection with the General Dental Services. The persons appointed will be required to pass a medical examination and contribute to the appropriate Superannuation Fund. The appointment will be subject to the Council's Standing Orders. Application forms may be obtained from the Acting Area Medical Officer, Town Hall, Barking, Essex, completed applications being returnable to the undersigned not later than April 18, 1951. E. R. Farr, Area Clerk. Town Hall, Barking, Essex.

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Scholarships and Prizes

Entrance Scholarship £100. Subjects: Chemistry, Physics, Biology and General Knowledge; Saunders Scholarship £20; Saunders Prize £5; Storer-Bennett Scholarship £80; Alfred Woodhouse Scholarship £35; Robert Woodhouse Prize £10; Lonnon Bursary £15; J. A. Smith Scholarship £32 10s.; Parris Prize about £6; Baldwin Scholarship £15; and Dolamore Prize £3. Fourteen Class Prizes awarded each year. The Athletic Ground is situated at Colindale. Applications for further particulars and School Calendar should be submitted to the SECRETARY.

WEST Sussex County Council. Appointment of two School Dental Officers. Applications are invited from Registered Dental Practitioners for the appointment of two full-time SCHOOL DENTAL OFFICERS—one for the Borough of Worthing and one for the Chichester area. The present salary scale is £835 x £25 to £935 per annum, together with travelling expenses in accordance with the County Council scale in the case of the Chichester appointment. The salary scale will be subject to any revision which may be necessary in the light of decisions reached by any appropriate negotiating body. The appointment will be subject to the approval of the Ministry of Education. Further particulars and form of application may be obtained from the County Medical Officer, County Hall, Chichester, by whom all applications endorsed "School Dentist" on envelope should be received on or before May 4, 1951. Candidates are requested to state when applying for the form whether they desire to apply for the appointment in Worthing or Chichester, or either. T. C. Hayward, Clerk of the County Council. County Hall, Chichester.

DORSET County Council. Applications are invited from registered Dental Surgeons for the whole-time appointment of ASSISTANT DENTAL OFFICERS. The work will consist mainly of the inspection and treatment of school children but the dental treatment of expectant and nursing mothers and of children under school age may also be included in the duties of the successful applicants. Salary and conditions of service in accordance with the Dental Whitley Council (Local Authorities), viz. £800 x £50—£1,250 per annum, together with a travelling allowance according to the County scale. Full particulars and forms of application may be obtained from the Clerk of the County Council, County Hall, Dorchester, to whom applications should be returned by April 21, 1951.

MIDDLESEX County Council. County Health Department. DENTAL OFFICER (whole-time), registered Dental Surgeon, required initially in Area 8 (Hayes/Harlington, Ruislip-Northwood, Uxbridge, Yiewsley and West Drayton). Private practice not allowed. Duties include inspection and treatment of mothers and young children and school dental service. Salary scale £750 x £50—£1,150 p.a. inclusive, according to experience and qualifications. Established, subject to medical examination and prescribed conditions. Applications (no forms) stating age, qualifications, experience, 2 referees to Area Medical Officer, Local County Offices, High Street, Uxbridge, by April 17 (quoting J.182, *B.D.J.*). Canvassing disqualifies. C. W. Radcliffe, Clerk of the County Council, Guildhall, Westminster, S.W.1.

NATIONAL Health Service. Argyll and Bute Executive Council would be pleased to hear from any qualified or registered dentist who might (a) be interested in setting up a full-time practice on either the island of Islay or the island of Mull, or (b) be prepared to provide general dental services on the island of Islay for a period during the coming summer utilising a mobile dental unit which will be available there. Any interested party might please communicate as soon as possible with the Clerk, Argyll and Bute Executive Council, Queen Street, Dunoon (Tel. Dunoon 693), who will be pleased to provide further particulars.

THE United Sheffield Hospitals. Royal Hospital Unit (450 beds). SENIOR DENTAL TECHNICIAN required in the Dental Department of the Sheffield Dental School. The salary and terms and conditions of service will be in accordance with P.T.B. Circular No. 2 issued by the Whitley Council. Applications, giving full details of past experience with copies of two testimonials, to be made to: A. P. Prentice, Superintendent, The Royal Hospital, West Street, Sheffield, 1.

CITY of Liverpool Education Committee. Walton Technical College. A. Swithinbank, M.Sc., Principal. Applications are invited for the appointment of LECTURER in DENTAL TECHNOLOGY (full-time). Trade experience is essential. Salary: Burnham Scale for Teachers in Establishments for Further Education. Application form and further particulars may be obtained from H. S. Magnay, M.A., Director of Education, 14, Sir Thomas Street, Liverpool, 1, to whom completed forms should be returned immediately. Thomas Alker, Town Clerk and Clerk to the Local Education Authority. (2536).

DENTIST wanted to practise privately in the Mull, Coll, Tiree, and Ardnamurchan area, Argyllshire, Scotland. New four-apartment house available and £1,000 interest-free loan to equip surgery can be arranged. Population 5,000—6,000. Reply to Town Clerk, Tobermory, Mull.

PRACTICES

Available

MORECAMBE, Lancs. Dental practice, old established business, central position, well equipped and good living accommodation. Price as a Going concern £4,500. Apply, T. Gardener, F.A.L.P.A., 20, Victoria Street, Morecambe. (Tel.: 658).

EXCELLENT opportunity for young L.D.S. Established 40 years, dental practice, good corner house also surgery and workroom equipment. Owner retiring. Garden and garage. Accept £2,000 for quick sale. Books audited.—Box 1651.

HOUSE and practice for sale in professional quarter of popular South coast resort. Established some years. Retirement owing to ill-health. Excellent opportunity for ambitious man; all modern equipment.—Box 1653.

EDGBASTON, Birmingham. Practice and house in excellent position for sale. Modern equipment, X-ray. Goodwill 20 per cent of 1949/50 turnover, audited. House and equipment by valuation.—Box 1655.

FOR sale, £5,500. Old established practice with house, perfect position in mid-Sussex town. Mechanic on premises—wonderful opportunity for young L.D.S. Reason for selling—ill-health.—Box 1657.

READING, Berkshire. Old established practice, Elizabethan house town centre. Ample room for living or extension of surgeries. Safe lease, low rental. Turnover £5,000. Vacant due to death. Quick sale desired.—Box 1659.

BRADFORD, Yorks. Practice, house, garage. Established 1914. Splendid living accommodation. Owner retiring.—Box 1661.

DENTAL practice, S.W.3 Lock-up surgery and waiting room in professional premises, worked 4 evenings weekly. Capable enlargement. £1,000 including equipment and work on hand or partnership with view.—Box 1663.

CHESHIRE. Busy, established, qualified practice; roomy modern house, built for dental practice in excellent residential district; easy reach of Manchester. First class equipment. Nominal price for goodwill. Genuine reason for selling.—Box 1504.

OLD established practice in charming and unique S.E. Coast market town. 2 miles from sea. Attractive old house on excellent lease terms—about 38 years to run. Surgery, waiting room, mechanical laboratory, with excellent technician. Living accommodation, small garden, toolshed, greenhouse, if required. Turnover approximately £4,000; low expenses. All books audited. Price goodwill, equipment, lease, £5,500, inclusive.—Box 1510.

FOR disposal. Old, well established and busy practice. East Midlands. 2 hours (rail) London. Mainly N.H.S. but some private. 2 complete modern surgeries and workshops. Excellent family living accommodation. Garage. Convenient terms.—Box 1508.

FASHIONABLE South Coast Town, established 1919, private and N.H. 11-roomed freehold house. Books audited. £4,500 including equipment and goodwill. Household furniture at valuation if needed. Owner going abroad.—Box 1327.

Wanted

OLD established practice required to purchase in S.W. England or Midlands.—Box 1667.

PRACTICE required. Preferably Halifax, Huddersfield area, or coast Lancashire or Yorkshire. Must be capable of expansion. Freehold premises, lock-up or otherwise.—Box 1536.

DENTAL Surgeon wishes to purchase a practice, with living accommodation, in South West England. Would exchange his old established London practice, ample living accommodation, or sell.—Box 1534.

EXPERIENCED Dental Surgeon would take over small practice or branch. Would consider suggestions to occupy 4 days per week. Full equipment available. Surrey/Sussex area preferred.—Box 1542.

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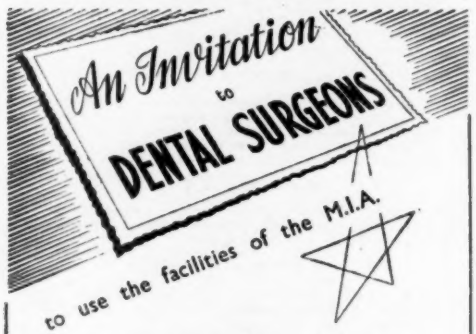

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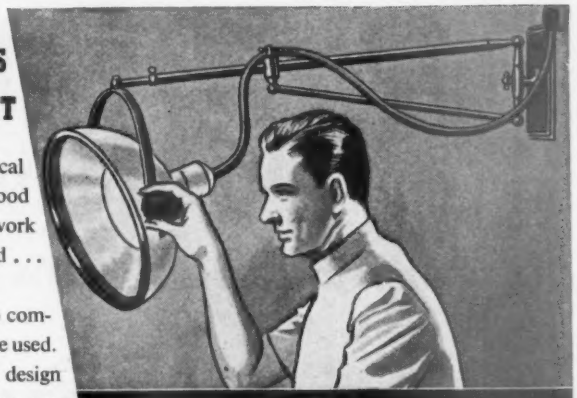

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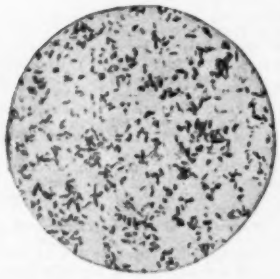

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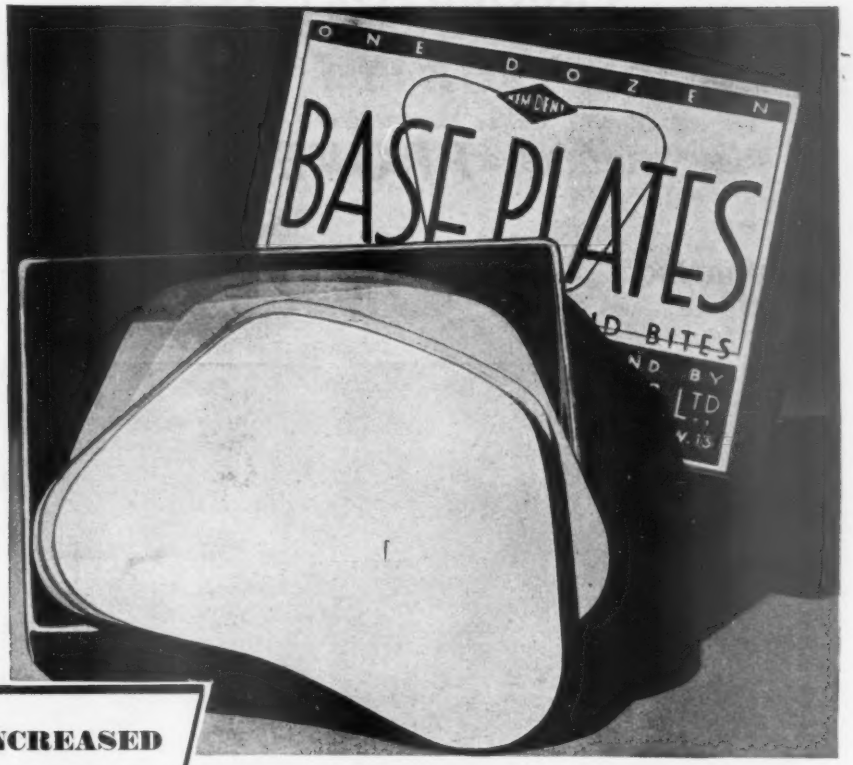

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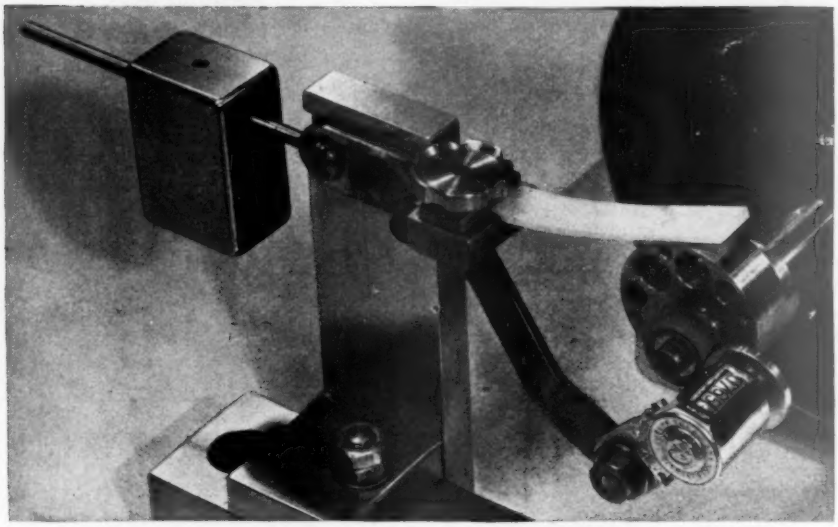

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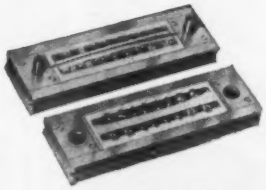

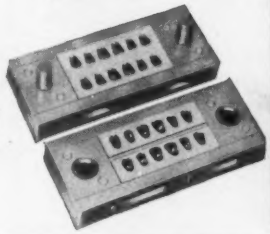

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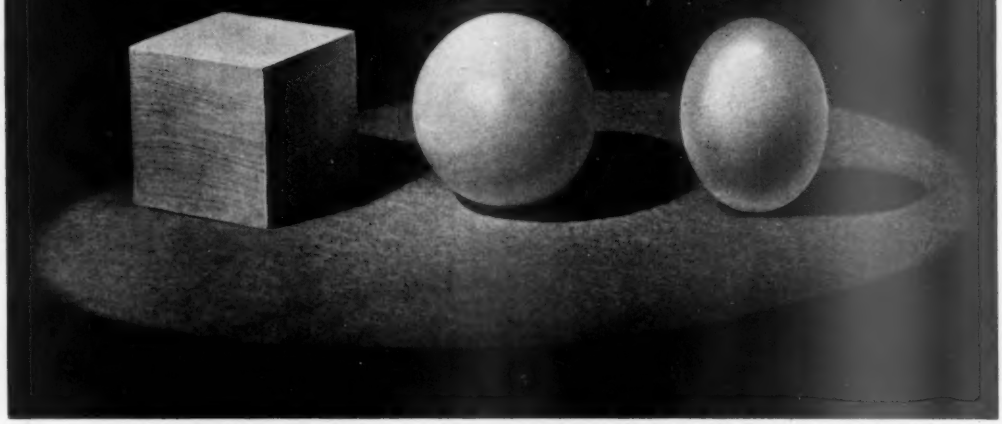

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BRITISH DENTAL JOURNAL

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ORIGINAL COMMUNICATIONS

ORGANIC CONSTITUENTS OF DENTINE

By MAURICE V. STACK, M.Sc.

Dental Research Fellow, Department of Dental Medicine, Guy's Hospital

DENTINE development is first noticeable as a thickening of the basement membrane between the inner enamel epithelium and the mesodermal primary pulp. The reticular fibrils which appear in this membrane are continuous with von Korff's fibres which next form in the pulp. The fibres of von Korff are built up from many fine fibrils which are cemented together and from their histo-chemical behaviour are characterised as precollagenous material. At the same time as the precollagenous matrix of dentine is laid down, the odontoblasts retreat and leave behind a protoplasmic process. It is believed that the reticular fibres of von Korff undergo progressive conversion to collagen while splaying close to the basement membrane. Finally, calcium salts are deposited in the form of submicroscopic crystals of apatite nature.

The organic matrix of the fully calcified tissue consists chiefly of collagenous fibrils about 0·3 micron in diameter (one-tenth that of average bacteria), arranged nearly at right angles to the dentinal tubules (Orban, 1949, pp. 102–3). The quantity of this matrix, its similarity to that of bone, and its conversion to gelatin by boiling, supported the histological evidence of its being collagen. (For analytical purposes, matrix is hereafter taken to mean "total organic matter.") There was thus little reason to make studies as detailed as those devoted to enamel (Leicester, 1949), but it is clearly desirable to be able to make a definite statement as to how much collagen is actually present in dentine.

Tomes (1895), isolating material insoluble in acid, concluded that dentine contained 19·6 per cent organic matter. A procedure described in another section of this paper has been used to demonstrate that he was correct, but that collagen accounts for about 92 per cent of this. He pointed out that previous estimates of the amount of organic matter were too high because dentine which has been dried at 100° C. still contains about 8 per cent of water held in chemical union with the calcium salts, but driven off on ignition ; it would appear, however, that it is the collagen which binds water. This same objection of Tomes applies to analyses in which the dentine has been extracted with alkaline ethylene glycol at the boiling point. Le Fevre and Manly (1938) examined the available literature for applications of the "glycol-ash" method to dentine, and gave a figure of 25 per cent "organic matter" ; their own results, however, averaged 18·6 per cent for a group of dentine samples mostly from slightly carious teeth dried very thoroughly. The majority of authors who have studied this subject by incinerating dentine also give the impression that there is 25–28 per cent "organic matter." In a recent paper, Bird, Gallup, Gaudino and Hodge (1948) compared both the above methods on about 50 samples of dried dentine and found 28 per cent "organic matter." Previous work by Bird, French, Woodside, Morrison and Hodge (1946) on a similar number of deciduous dentine samples had shown an average of 24 per cent, but the range was unaccountably great (5–42 per cent). Inverted commas enclose the phrase "organic matter," where this has been estimated by the "glycol-ash" method or by incineration, to indicate the inclusion of water not removed at 100° C.

The problem can be approached in another way by measuring the amount of protein present, instead of weighing the sample before and after incineration. As the quantitative isolation of the few hundred milligrams of collagen present in a tooth is laborious, it is reasonable to digest a small portion of dentine with sulphuric acid in order to convert the protein to ammonium sulphate which can be

estimated easily and expressed as nitrogen. Results, with standard deviations, obtained by several authors who have used this method, are given here and they show the difference between the degrees of calcification in bone and dentine. Armstrong and Brekhus (1937) reported 3·36 ± 0·14 per cent nitrogen on 20 dentine samples, dried at 60° C. Bowes and Murray (1936) bulked the dentine ground from premolars, the sample from 80 teeth with minimal hypoplasia containing 3·43 per cent nitrogen.

More figures are available for compact bone free from adherent tissue. The best results are probably those of Baker, Butterworth and Langley (1946) who found 4·7 ± 0·3 per cent nitrogen (27 samples). Vogt and Tønsager (1949) give results from which the same figure may be calculated on 33 samples. Radasch (1921) compared various procedures for the preparation of samples before incineration. Calculating from about 70 of his results, human bone was found to contain 34 ± 1 per cent " organic matter," excluding carbon dioxide. Having mentioned the values reported for the " organic matter " and total nitrogen of human bone and dentine, it may be of interest to point out that the ratio of these measurements lies between 7·2 and 7·4 for both tissues. However, because water should be excluded from " organic matter " results, the true ratio is nearer 5·8. This figure is somewhat above the ratio of the weight of purified collagen to its total nitrogen content, in order to account for the presence of the other organic constituents. " Average " dentine thus contains 20 per cent organic matter.

Variation in Degree of Calcification

Analyses on each of 20 premolars from children averaging 13 years of age showed the same mean 3·38 per cent total nitrogen (vacuum-dried samples) and 0·18 per cent standard deviation as did those on an equal number of other types of teeth from patients averaging 33 years of age. While the nitrogen content of bone appears to fall with increasing age, this is not so for dentine (the correlation coefficient with respect to these variables was below 0·05 on the 40 dentine samples, ages 10–65 years). It was therefore considered unlikely that there would be marked variations due to tooth type, so that while premolars removed for orthodontic reasons formed the major supply of sound teeth, other types were included. Recently erupted specimens were preferable in order to have the minimum of secondary dentine present.

TABLE I.—COMPARISON OF ANALYSES ON POOLED DENTINE FROM TEETH OF THE FOUR MAIN TYPES

Tooth Type	*Incisor*	*Canine*	*Premolar*	*Molar*
Number pooled ...	80	50	80	20
Ash %	71·5	72·4	72·2	72·2
Total nitrogen % ...	3·50	3·38	3·45	3·45
Nitrogen/Organic*	138	140	140	136
Citric acid % ...	0·86	0·86	0·89	0·87

*Expressed as grammes of nitrogen per litre of normal sodium thiosulphate. (× 100.)

Fig. 1 is a histogram based on 45 dentine samples on which total nitrogen estimations were made. For comparison a similar distribution is shown for the " organic matter " in 48 samples (fig. 2) recorded by Bird, Gallup, Gaudino and Hodge (1948). In both sets, 90 per cent of the values fall within 10 per cent of the means. If the analytical accuracy of both sets of determinations is of the same order, this is an indication that collagen binds a constant fraction of water. However, the citric acid content appears twice as variable (Zipkin and Piez, 1950).

It was expected that the dentine of corresponding teeth from opposite sides of the same dental arch would show the same degree of calcification. Results on 16 such pairs of maxillary teeth, shown in Tables II and III, have not given that impression. By measuring total nitrogen, it was evident that corresponding teeth were not more alike in dentine collagen content than all the teeth comprising the group (Table II). In the second group (Table III), total organic matter was determined by digestion with " dichromic-sulphuric " acid. The analytical errors in both groups were low enough to permit a demonstration that the group variations were of the same order as the variations within pairs. From these results, the biological variation appears to be between 2 and 4 per cent. For the groups of 20 dentine samples referred to earlier, the range was 4–6 per cent. Most samples of dentine will, therefore, contain 19–21 per cent organic matter.

This comparison of variations is supported by calculations on data recorded by Bird, Kelman, Lerner, Rosenfeld, Totah and Hodge (1948) for teeth showing marked attrition on the left of the upper and lower jaws only. A full mouth extraction from this patient, who had periodontal disease involving extensive loss of alveolar bone, yielded 12 corresponding pairs of teeth for which " organic matter " analyses of the dentine were given. The mean percentage variation (23 per cent) " within " pairs was not significantly different from the mean percentage variation (15 per cent) of the mean of each pair from the general mean of 17·8 per cent (cf. Table I), a value close to that found for the amount of collagen in dentine. However, the variability was more than five times as great as that found during the present work using total

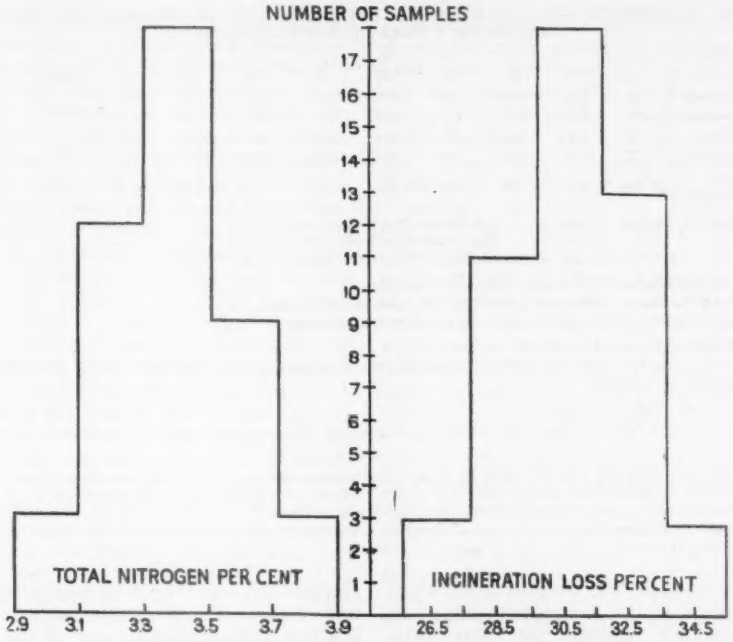

FIG. 1. FIG. 2.

FIG. 1.—Variation in total nitrogen content among 45 dentine samples.
FIG. 2.—Variation in incineration loss among 48 dentine samples (1948).

TABLE II.—PERCENTAGE VARIATION IN TOTAL NITROGEN DETERMINATIONS ON THE DENTINE OF 8 PAIRS OF MAXILLARY TEETH

Tooth type ...	...		4	4	4	4	5	5	6	8		
Age (years) ...	...		10	11	11	13	12	19	10	21	*Mean*	†Σ^{Δ^2}
(1) Analysis *	A		0·5	0·3	2·3	2·5	0·6	1·3	1·8	0·6	1·00	13
Variation	B		2·1	0·3	0·6	0·0	0·0	2·4	0·0	0·6		
(2) Group *	A		(7·8)	6·0	3·3	4·5	3·3	5·1	3·0	4·8	3·14	38
Variation	B		(11·6)	2·7	4·8	0·9	1·8	0·6	1·3	1·8		
(3) Pair Variation *	AB		3·5	8·8	1·4	3·7	1·5	5·8	1·8	3·1	3·89	45

†Comparison between (1) and (3) Significant—P = 0·001 from t = 4·1
(1) and (2) Significant—P = 0·001 from t = 4·3
(2) and (3) Not Significant—P = 0·6 from t = 0·8

nitrogen and organic matter determinations, and by Bird, Gallup, Gaudino and Hodge (1948). Putting the conclusion in another way, it seems that the variation in degree of calcification in the dentine of teeth from a group of individuals is no greater than this variation from one tooth to its homologue in the same dental arch.

SIZE OF GROUPS IN SAMPLING[1]

Having established the biological variation in a relatively small group from the general population, it is then possible to establish the minimum number of dentine samples required to make up a group having properties such that the intended determinations of ash, etc., would be of some significance. To all such determinations a certain coefficient of variation is applicable which is a measure of the accuracy achieved. This coefficient was slightly greater than 1 per cent for total nitrogen estimations which were the basis for this choice of group magnitude. It could then be said statistically that, if one dentine sample were analysed twenty times, on not more than one occasion would it be likely for an estimation to be more than 2 per cent different from the mean.

In order to achieve a suitable degree of

[1]This section is included because of its general application to biological research, e.g. an investigator may wish to decide whether the variability of successive DMF counts on a patient are in sufficient agreement to permit significant differences to be detected in the caries status of that patient a year later (cf. Jackson, 1950).

TABLE III.—PERCENTAGE VARIATION IN TOTAL ORGANIC DETERMINATIONS ON THE DENTINE OF 8 PAIRS OF MAXILLARY TEETH

Tooth type		1	1	2	2	3	3	4	7		
Age (years)		25	25	25	42	42	42	14	15	*Mean*	†$\Sigma^{\Delta 2}$
(4) Analysis Variation	* A	1·2	0·7	0·7	0·0	1·2	2·3	1·4	0·0	0·85	8
	B	0·4	0·7	1·2	0·4	0·7	2·3	0·4	(3·5)		
(5) Group Variation	* A	6·0	4·3	4·3	0·4	0·4	2·3	6·4	6·2	2·94	65
	B	1·0	0·4	1·7	6·0	0·7	2·1	3·7	1·5		
(6) Pair Variation	* AB	4·8	4·0	5·9	6·5	0·3	0·2	2·6	4·7	3·64	39

†Comparison between (4) and (5) Significant—P = 0·001 from t = 3·7
(4) and (6) Significant—P = 0·001 from t = 4·3
(5) and (6) Not Significant—P = 0·7 from t = 0·6

* Analysis Variations : Differences % between duplicates.
Group Variations : Differences % between each value and group mean.
Pair Variations : Differences % between pair values and pair mean (× 2).

Members of each pair are designated "A" and "B."
Bracketed values, far outside the 5 per cent statistical level of significance ($m \pm 2\sigma$) chosen for the comparison of variations, are excluded.

NOTE FOR TABLES II and III:

$\sigma^2 = (\Sigma\Delta_1^2 + \Sigma\Delta_2^2)/(n_1+n_2-2)$, where σ is the standard deviation, from which "t" is given by

$$\sigma t = (m_1 - m_2)\sqrt{n_1.n_2/(n_1+n_2)}$$

Δ_1 & Δ_2 are deviations from the means m_1 & m_2 of the samples totalling n_1 & n_2 in the respective groups. The value of "t" is entered in a table against (n_1+n_2-2) "degrees of freedom," giving the probability P that the groups are derived from the same populations. Here, the highly significant P = 0·001 means that analytical variations do not prevent the demonstration of biological variations. (cf. Brownlee (1949), Industrial Experimentation, 4th Ed., pp. 34, 181. H.M.S.O.)

significance in results it was considered sufficient to have groups of dentine samples of such a size that the difference between the mean total nitrogen and the total nitrogen of the universal mean (unknown) was not likely to exceed twice the above degree of analytical variation. This condition is simply fulfilled in statistical practice by having groups of N items, where N is the square of the ratio between biological and analytical variations—in the following case about 25. For example, the two groups of 20 dentine samples already mentioned showed a mean of 3·38 per cent total nitrogen, the standard deviation being 0·18 per cent, but if pooled material had been analysed on numerous occasions, the standard deviation of analysis would have been about 0·035 per cent. This group would therefore hardly have been of sufficient size to justify the reporting of analytical results intended to be close to those derived from a very large number of dentine samples.

Experimental

Preparation of Dentine on a Small Scale.—Sound, non-carious, recently erupted teeth were extracted in the hospital and stored in chloroform-saturated water at room temperature. After not more than a few days they were dried over phosphorus pentoxide in a vacuum desiccator for a week, and then in an oven at 100° C. for several hours. They were then prepared for analysis by a procedure considered to be least destructive to the collagen. Enamel was chipped off, and the whole surface ground until only dentine and cementum were visible. The last few millimetres were cut off the roots, and the main portion of the tooth reduced to pieces of similar size by fracturing with pliers. Residual pulp tissue was removed by grinding as soon as the canals were exposed. Dentine fragments obtained in this way could be pulverised to pass a "100-mesh" sieve in ten to twenty minutes. A thermocouple embedded in the percussion mortar used did not indicate any general temperature rise greater than 20° under the conditions employed, and it was considered that very little destruction of collagen was likely to have occurred. Not more than 2–3 per cent cementum was present judging by the density range of the product, and its presence was disregarded ; on an analytical basis, cementum was shown to behave like dentine with one-third more organic matrix.

However, the same amount of time devoted to obtaining dentine powder by filing or grinding procedures resulted in a destruction of collagen equivalent to that observed when crushed dentine was heated for two hours at 150° C. These conditions resulted in the average 5 per cent water-soluble nitrogen being increased to 15 per cent. Henschel (1943) has calculated that this temperature is probably exceeded in the neighbourhood of the grinding instrument during the normal process of cavity preparation. Nevertheless, dentine powder can be dried at 105° C. for six hours without converting any

more of the matrix to gelatin than appears to be in that form already. By thorough extraction of ground dentine with alcohol and ether, 0·2 per cent fat was recovered from two 10 gramme portions.

Preparation of Dentine on a Large Scale.—In order to prepare sufficient dentine to ensure useful analytical figures, it was clearly necessary to use mechanical means. Dry sound teeth were ground to expose clean enamel and cementum, and pulverised in a hammer mill by imposing conditions of gradually increasing severity. For a batch of 100 grammes, the material was put through the machine ten times, screening with a " 60-mesh " sieve on each occasion. The flotation process described by Manly and Hodge (1939) was then applied to separating the dentine, after a preliminary " air flotation " which removed the greater part of the tenuous pulp fragments. Enamel and metal particles scoured from the mill were removed by suspending the dry powder (" 60/200-mesh ") in a bromoform-acetone mixture of specific gravity (S.G.) 2·70. The supernatant dentine thus separated from the heavier enamel was then centrifuged from a solvent mixture of S.G. 2·05 from which cementum will rise, and finally purified by flotation in a liquid of S.G. 2·40. Bromoform was removed by washing the purified dentine with acetone and drying.

When the material was required in large quantities for isolating collagen, a simpler procedure was evolved. Sound roots from carious teeth were pulverised without cleaning and lighter impurities were removed by floating them in chloroform, S.G. 1·7. After decalcification, dialysis and drying, the collagen (S.G. 1·35) could now be floated in this solvent, and therefore impurities which failed to rise to the surface during the first treatment would sink during the second. By this means a kilogram of dentine powder was amassed (largely " 60/200-mesh," in 90 per cent yield), and the willing co-operation of the many dental surgeons who made this possible must be gratefully acknowledged.

It was necessary to check that little enamel remained in the dentine required for analytical purposes. The method of Manly and Hodge (1939) was modified so that when making a microscopical examination of the sample suspended in the recommended chloronaphthalene-paraffin mixture, a more marked departure from focus than they recommended resulted in the enamel particles appearing as brilliant yellow spots contrasting with the blurred dark brown dentine particles. Less labour was thus involved in counting one enamel particle to every 200–1,000 of dentine, which was the required degree of purity.

Material obtained by the solvent fractionation of mechanically pulverised dentine was compared with that produced on a small scale, and not found to differ by any extent significantly greater than the analytical errors of the criteria applied. This was unexpected when it was known that grinding procedures broke down over 10 per cent of the collagen.

Analyses on Groups of Incisors, Canines, Premolars and Molars.—Table I shows the small variations in ash, total nitrogen and citric acid in the dentine of 250 teeth classified according to the four main types. Ash was estimated by incinerating portions, weighing between $\frac{1}{2}$ and 1 gramme, which had just been dried for two hours at 100°, and also by extracting such portions for two hours with 3 per cent potassium hydroxide in boiling ethylene glycol. The loss in weight was determined, in the second procedure, after washing out the extracting solvent with several changes of boiling water and drying with the aid of acetone. Allowing for carbon dioxide (3 per cent) driven off during ignition, the weight loss averaged $25 \pm 0{\cdot}5$ per cent for both methods, this value for " organic matter " being about 5 per cent high because this amount of water appears to be bound to the collagen present. It was considered that dentine was properly freed from moisture at 100°, since the same percentage of water was removed from samples extracted with anhydrous methanol and titrated with Karl Fischer reagent. The method of Almy, Griffin and Wilcox (1943) was employed on 50–100 mg. portions of dentine.

As these samples lose 3 per cent of their weight if they are dried under these conditions after preliminary vacuum drying, the 3·38 per cent total nitrogen recorded in a previous section for the two groups of 20 dentine samples should be raised to 3·48 per cent for comparison with the figures given here. Total nitrogen estimations were made in triplicate by a procedure resembling that described by Miller and Miller (1948), who digested samples with sulphuric acid (using a peroxide catalyst) and measured the resultant ammonia in a photo-electric colorimeter by adding Nessler's reagent.

An improved method (Weil-Malherbe and Bone, 1949) was used for citric acid determinations because of the discrepancy between the values of 0·80 per cent and 0·93 per cent reported by Free (1943) and by Zipkin and Piez (1949) respectively. The mean result (expressed as citric acid monohydrate) was intermediate between these values. However, Zipkin and Piez (1950) later reported 0·89 per cent citric acid on their previous series of dentine samples. Another row in Table I records the ratios of

two estimations, the first being that of total nitrogen (a measure of the collagen) while the second accounted for all organic matter including collagen. The latter involved the oxidation of samples identical with those in which the total nitrogen was measured. About half the "dichromic-sulphuric" reagent (Johnson, 1949) with which the sample was digested remained to be estimated by liberating iodine from potassium iodide and titrating this with sodium thiosulphate. The ratios[1] are expressed as "grammes of nitrogen per litre of normal thiosulphate." As it was shown during the present work that nearly all the 18 per cent yield of protein obtained by decalcifying dentine is collagen, a "model dentine" containing 1 part of citric acid, 20 parts of dentine collagen and 80 parts of deproteinised dentine was prepared. In the case of "model dentine," the ratio was 150 against a mean of 137 ± 2 for dentine. The isolated collagens from bone and dentine showed a higher ratio of 155 ± 1 as did hide collagen used as a reference sample (Bowes and Kenten, 1948). It has not yet been possible by this direct ratio measurement to account for all this discrepancy of 8 per cent between the ratios for dentine and its "model," in spite of extensive analytical repetition. The other known organic constituents account for less than half this difference, but further evidence indicates that similar amounts of other unknown organic substances are unlikely to be present.

Thus, the "dichromic-sulphuric" reagent was calibrated with citric acid, fat, chondroitin sulphate and collagen because these varied types of organic compound are equivalent to different quantities of this reagent. Expressing the values as "milli-equivalents per gramme of substance" (meq./g.), a "balance sheet" was constructed for the soluble fraction resulting when fat-free dentine was treated with dilute acid and the collagen removed. Citric acid dissolves during decalcification, as well as half the mucopolysaccharide (as stated later). The amounts of these constituents were known, and measurement of the total nitrogen showed how much collagen had been made soluble.

In such an experiment, powdered dentine was decalcified overnight with phosphoric acid (chosen because total nitrogen and organic matter can then be measured in the same solution). The collagen was separated and the acid solution of the remaining components found to be equivalent to 1·68 meq./g. dentine. Mucopolysaccharide (2·1 mg., calculated as chondroitin sulphate from the hexosamine content) and citric acid (8·8 mg.) were present, and the nitrogen content was equivalent to 7·1 mg. collagen (3·5 per cent of the total collagen). On the same weight basis, 66, 83, and 114 meq. respectively of the dichromate reagent were required to oxidise these substances. Calculating the total oxidisable material in the acid-soluble fraction $(0{\cdot}0021 \times 66) + (0{\cdot}0088 \times 83) + (0{\cdot}0071) \times 114)$ equals 1·68 meq./g. dentine.

Another experiment was evaluated with the aid of data concerning the mean quantity of reagent required to oxidise dentine (25·8 meq./g.), and the ratios of total nitrogen to organic matter for collagen (155) and for the acid-soluble material (70). From 5 grammes dentine, 0·04 gramme protein were calculated to be present in the solution from which 1·05 grammes collagen were separated. This quantity of dentine would have been oxidised by $5 \times 25{\cdot}8$ or 129 meq. reagent. The collagen would likewise account for $1{\cdot}05 \times 114$ or 120 meq. reagent. It may be seen, less obviously, that the remaining organic matter would be oxidised by $0{\cdot}04 \times 114 \times 155/70$ or 9 meq. reagent. From both these typical experiments, the non-protein organic matter released during decalcification appears to be 6 per cent of the total organic matter. Citric acid (5 per cent) and the dissolved mucopolysaccharide (1 per cent) account for this adequately.

The Collagen of Dentine.—Dentine was decalcified in 10-gramme batches by suspending in water and running in normal hydrochloric acid at such a rate that the immersed electrodes connected to a pH meter never registered less than pH 3. A similar product was obtained more easily in the same yield by leaving the dentine powder with 10 parts of this acid overnight in a refrigerator. About 3 per cent of the collagen dissolved during the process, and 18 per cent of the original weight of dentine, was recovered after dialysing and drying the collagen thoroughly.

Carbohydrate in this material was measured by a simplified modification of a colorimetric reaction with orcinol (a substituted phenol) in sulphuric acid (Friedmann, 1949). This showed that, like hide collagen (Beek, 1941), dentine collagen contained about 1 per cent of a carbohydrate consisting of equal parts of glucose and galactose. There was about one-third this quantity of hexosamine measured by the method of Morgan and Elson (1933), which was also used to confirm the statement made by Rogers (1949) that dentine contains 0·10 per cent hexosamine. It would appear from these figures that half the hexosamine-containing component was dissolved during

[1] Multiplied by 100 for convenience.

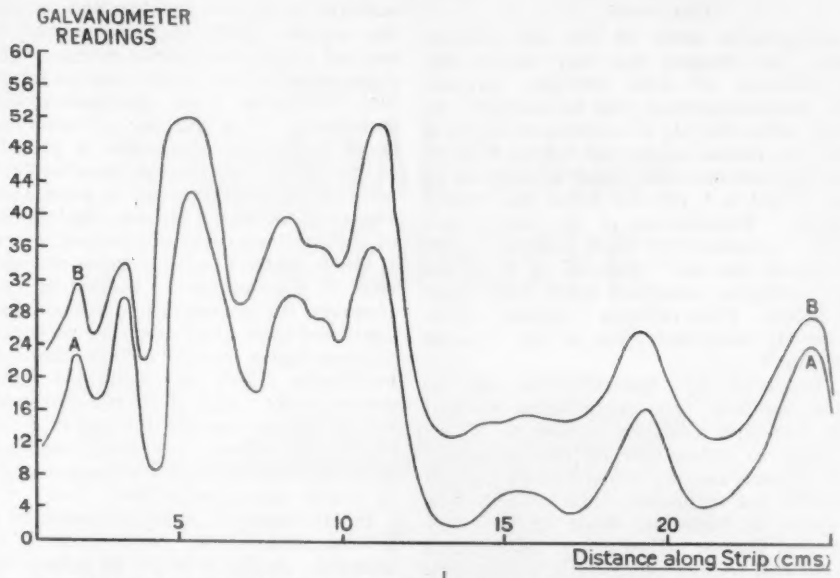

FIG. 3.—Optical density along developed paper chromatograms of (A) a hide collagen hydrolysate, and (B) a "model hydrolysate" composed of 14 of the constituent amino acids in the proportions as tabulated by Bowes and Kenten (1948).

the decalcification, but no attempt was made to estimate it in the supernatant fluid. Both carbohydrate and hexosamine are present in a combined form, the latter being associated chiefly with a hexuronic acid as Pincus (1950) has shown in his mucopolysaccharide preparations from dentine.

The total nitrogen of the batches of collagen produced varied from 18·3–18·4 per cent on a moisture- and ash-free basis. Hide collagen, which also showed 18·4 per cent nitrogen under the drying conditions used (two hours at 100°), has a low ash of 0·05–0·10 per cent, but that from dentine contained about 1 per cent ash of which less than half was phosphate. This higher figure was assumed to be due to incomplete decalcification. Originally, the ratio of nitrogen to phosphate was 1 : 13, but after decalcification this became 20 : 1.

Amino Acid Analysis of the Organic Matrix.—The technique of paper chromatography has already been described in this journal (Atkinson and Matthews, 1949). For the present purposes 0·1 per cent ninhydrin, used to develop a purple colour with the amino acids, was dissolved in the upper layer of a mixture containing 50 per cent water, 40 per cent butanol and 10 per cent acetic acid (Partridge, 1948). This solvent flowed down a paper sheet, 30 × 30 cm., carrying the amino acids at varying rates from hydrolysates spotted every 2·5 cm. along the top horizontal fold. When the fastest approached the lower edge, the sheet was dried at 70° to remove solvents and cause reaction between the amino acids and ninydrin. Lines were then drawn between each row of spots with a Perspex rule notched every centimetre, so that when the strips were cut out and passed through a photoelectric colorimeter, the optical density could be plotted at and between these intervals along the strip. This produced a "spectrum" of the amino acid constituents, and typical results for hide collagen and a "model hydrolysate" containing the correct proportions of all the 14 amino acids present in hide collagen to the extent of at least 1 per cent (Bowes and Kenten, 1948) are shown in fig. 3. In this manner, hydrolysed protein fractions can be characterised rapidly, and the evidence obtained led to the conclusion that the water-soluble protein of dentine is gelatin, and that the residue left after autoclaving all the collagen to gelatin is neither elastin nor reticulin (Stack, 1950). Otherwise, all the protein of the organic matrix appeared to be collagen, and any histological evidence to the contrary may be explained by the very small amount of protein detected by such means.

Discussion

A comparative study of skin and dentine collagens has revealed that they contain the same amounts of total nitrogen, organic matter, glucose-galactose, and hexosamine. In addition, when the pH of suspensions of these samples was plotted against the volume of tenth normal hydrochloric acid added at intervals to reduce the pH to 1, the two curves were nearly coincident. Examination of the amino acid "spectra" revealed very slight differences, but it was noted that the "spectra" of bone and dentine collagens resembled each other even more closely. Hide collagen "spectra," however, closely resembled those of the "model hydrolysate."

As produced by decalcification, dentine collagen contains very much more mineral matter than hide collagen, but as no efforts were made to reduce this by long treatment with consequent sacrifice of yield, this difference is probably not significant. The same may be said about the statement made by Rosebury (1930), that dentine collagen was disintegrated by 10 per cent sodium hydroxide in three to five hours, while collagen from tendon and hides took only two hours or less, since the rate of solution depends largely on the degree of division of the fragments.

Figures obtained by other workers have not revealed this close similarity. Deakins (1940) estimated that the matrix of normal dentine contained 17·0 per cent nitrogen, while Brekhus, Armstrong and Cavett (1937) isolated material containing 15·1 per cent nitrogen by a precipitation of the gelatin from dentine with trichloracetic acid. Amino acid constituents of dentine have been listed by Block, Horwitt and Bolling (1949) and by Atkinson and Matthews (1949). The later authors announced the presence of tryptophane which appeared on paper chromatograms and was confirmed by two colorimetric tests. A faint reaction to one of these tests was observed in the present work when a relatively large quantity of the isolated collagen was examined. Hide collagen is reported to contain "0·0 per cent" tryptophane, and the amount detected in dentine collagen was certainly below 0·05 per cent.

The importance of the organic matrix of dentine in connexion with caries has also been stressed recently by Evans and Prophet (1950), who investigated the action of bacterial filtrates on dentine and the decalcified matrix, finding collagenase activity due to the anaerobic organisms. In a further paper (1950) they showed which enzymes were involved. Engel (1950) reported both collagenase and hyaluronidase activities in carious dentine, and thought that the organic matrix glycoprotein was depolymerised during the carious process. The term "glycoprotein" is usually reserved for proteins with which far more mucopolysaccharide is associated. If a quantity of hexuronic acid equal to that of hexosamine is present, then only 0·6 per cent mucopolysaccharide can be admitted here to be present in dentine collagen. Pincus (1950) has indeed described the isolation of sufficient mucopolysaccharide (2·6 per cent). If this is attached to the collagen, the use of the label "glyco-protein" would be justified. However, the hexosamine content of dentine as calculated from analyses on his preparations is six times higher than the 0·10 per cent measured by Rogers (1949) and confirmed during the present study. Also, if 2·6 per cent mucopolysaccharide were present, the sum of dichromate reagent equivalents, previously mentioned as applying to the acid-soluble components, would be double that actually found.

In the study of biological variation among dentine samples, two chief points of interest emerged. As far as could be judged from the relatively small group studied here there was a normal distribution of total nitrogen values, and also of the incineration loss values reported by Bird, Gallup, Gaudino and Hodge (1948). This was not so in the case of bone where there is some degree of "skewness" in the histograms obtained from 60–70 values reported for both types of measurement by several authors. The other finding was less expected, and deserves comment which will not be attempted in this communication. Corresponding pairs of teeth differed as much in degree of dentine calcification (judging by total nitrogen or organic matter determinations) as the 16 teeth comprising each group. The mean variations of the values obtained in both series were about 3 per cent of the means, whereas the variability of the analyses (expressed in the same way) averaged one-third of this, and was significantly different ($P = 0{\cdot}001$).

Summary

The preparation of powdered dentine in small and great quantities has been accomplished without significant destruction of the organic matrix. Variation in the degree of calcification in a series of dentine samples was studied with the additional object of deciding the number required to be grouped together in order to report analyses likely to have sufficient significance. A statistical treatment was also used to show that dentine samples from corresponding pairs of teeth in the same dental arch were no more similar in degree of calcification than

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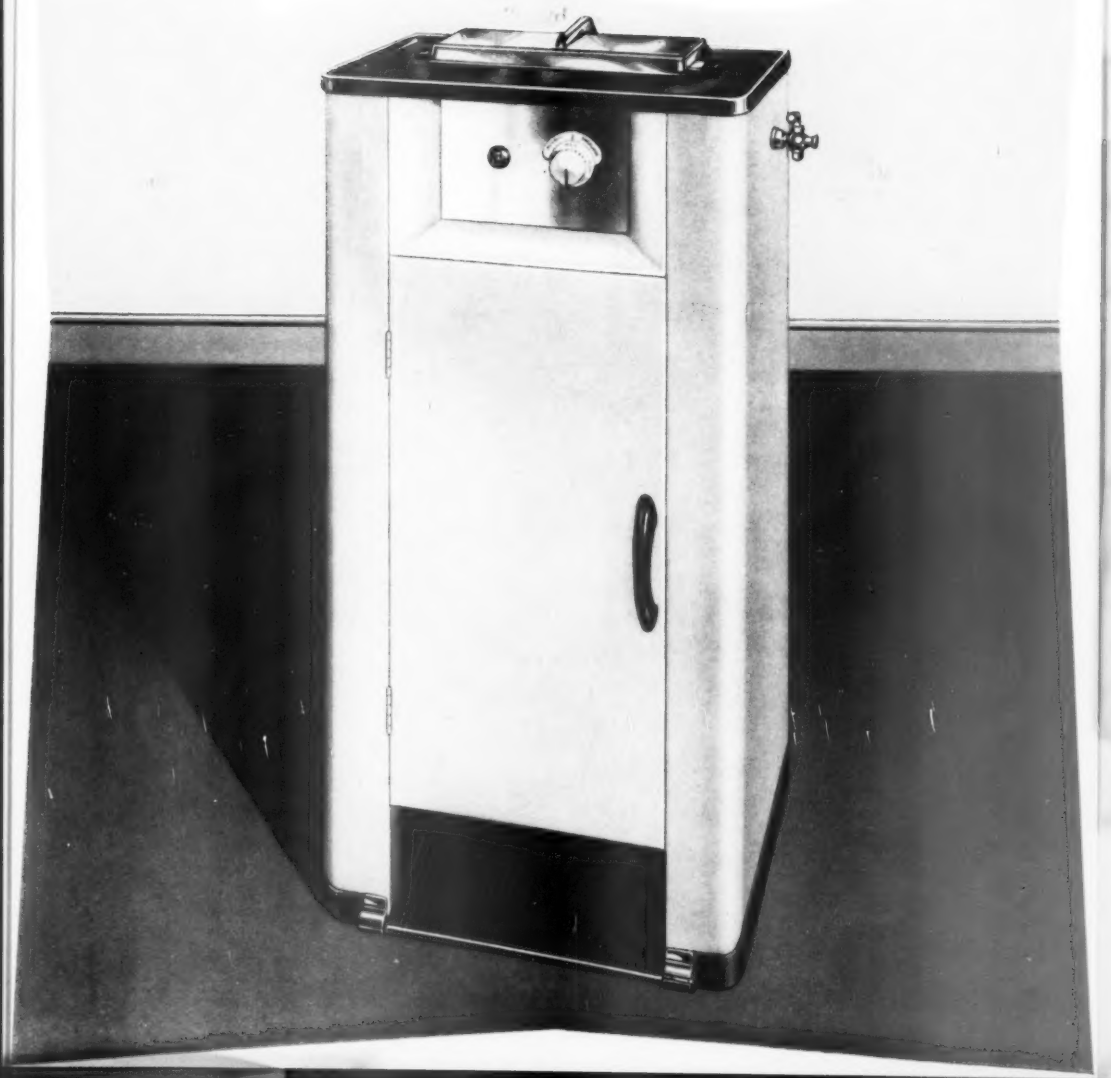

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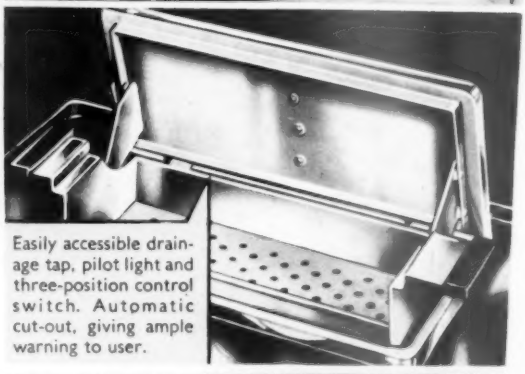

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the average. Analyses for total nitrogen, ash and citric acid are given for the pooled dentine from 250 teeth grouped according to the four main types.

Dentine collagen has been shown to be very similar to hide collagen, already investigated in considerable detail by others. An insoluble residue was differentiated from reticulin and elastin. By paper chromatography and by comparison with a "model dentine" containing collagen and deproteinised dentine, it was shown that the amount can be assessed with sufficient accuracy when the percentage of nitrogen is multiplied by a factor. When citric acid was included in "model dentine," it was clear that this is the only other organic substance present in significant amounts in the organic matrix of dentine. The proof involved concurrent measurements of total nitrogen and total organic matter, a method which avoided error due to water still present after "drying," at 100°. It can now be stated that "average" dried dentine contains 18 per cent collagen, 0·9 per cent citric acid and 0·2 per cent each of insoluble protein, mucopolysaccharide and fat; the inorganic constituents (excluding water) total 75 per cent.

ACKNOWLEDGMENTS

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SOME THERAPEUTIC AGENTS AND THEIR USES IN THE PUBLIC DENTAL SERVICE[1]

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I HAVE chosen this subject for several reasons. In the first place the post-war period has seen a great advance in therapeutics, particularly chemotherapeutics, both in the synthetic field—sulphonamides—and in the use of antibiotics—penicillin, streptomycin, etc.—and also of the anti-histamine preparations.

It is, unfortunately, inevitable that preparations of such potency are apt to be regarded as a panacea for all ills, begetting the usual publicity in the lay press, to the extent that patients expect, nay demand, treatment with these preparations. From the professional side their relative safety in use leads to a familiarity which may have serious consequences through careless prescribing, and indeed, I would go further and say that quite often they are prescribed unnecessarily and inadvisedly in the mouth. Simpler methods, such as irrigation, should be employed in the first instance in order to "clear the decks" so that the chosen preparation can do its work to the best advantage.

Indiscriminate prescribing should not be indulged in and patients should always be kept

[1] Read at a Meeting of the Public Dental Officers' Group of the British Dental Association, Birmingham, July 12, 1950.

under observation or supervision. I have in mind a case in which penicillin mouth tablets had been prescribed, one tablet to be sucked every two hours—this treatment was still being carried out by the patient, when seen by me for consultation, six weeks later, and that is by no means an isolated case.

Again, the outstanding results produced with e.g. the antibiotics, tend to obscure the older preparations which I maintain still have their uses and should not be discarded; indeed when their uses are properly appreciated they should be employed from choice. In the practice of medicine, opium and mercury are said to be indispensable and I would suggest that in dental surgery the same may be said of iodine. I have, therefore, selected for this paper certain preparations which may be of use in the Public Dental Service, and I have made certain observations and drawn attention to possible dangers.

Speaking generally, when using therapeutic agents do not "dabble," by that I mean, that if you have decided to use a certain preparation be certain that you know its limitations, side effects, and most important the *correct* dosage. I emphasise the word "correct" because in some instances an inadequate dose can produce an undesirable result (this is referred to later).

In this respect also diagnosis is so important, you should know what you are treating, which knowledge should govern your choice of the therapeutic agent. Avoid if possible "hit or miss" treatment and use the simpler agents first, some of which are more or less specific for certain conditions likely to be met with in the mouth.

The theme of this paper is the practical application of these therapeutic agents and it must be borne in mind that these observations are addressed to public dental officers who, in the main, are not concerned with hospital treatment, therefore it is assumed that the cases to be treated are ambulant.

Direction of Attack

In treating cases of infection in the oral cavity, more especially "open" infection, it should be remembered that large numbers of organisms are swallowed and survive the acid content of the stomach to find themselves, as it were, in the relative security of the gut where they multiply, producing toxins which are absorbed, and lower the general resistance and may be partly the cause of the accompanying rise in temperature.

It is my standard treatment in dealing with this type of case in hospital to order an enema (soap and water) which clears the lower bowel, removing thereby a large amount of the toxic matter, with usually a corresponding fall in the patient's temperature. It has the added advantage as already referred to of reducing the "load" of work for the therapeutic agent being administered.

In ambulant cases a similar though perhaps not so dramatic an effect can be produced by the use of a suitable aperient in adequate dosage. This may be considered "old-fashioned" treatment but I have practised it for over twenty years and invariably with good result.

And now to the therapeutic agents I have selected for this paper.

Penicillin

I or F	Pentenyl-penicillin
II or G	Benzyl penicillin
III or X	Hydroxybenzyl-penicillin
IV or K	Amyl penicillin (dehydro-F) Heptyl penicillin

The standard penicillin is II or G.

The organisms likely to be met with in the mouth are, in the main, sensitive to penicillin. Oral infections are usually caused by staphylococci, streptococci with *Spirochæte vincenti* and *B. fusiformis* less frequently.

The line of treatment will depend on whether the infection is open or closed, acute or chronic, and whether this treatment is to be purely local or systemic (parenteral) or a combination of both.

The methods available for using penicillin are (*a*) injections, (*b*) lozenges/pastilles, (*c*) solutions (oral), (*d*) cones, (*e*) powder.

Injections

In order to obtain the maximum benefit from penicillin treatment it is essential that the blood level should be maintained, but it is even more important that the *initial* dose should be large enough to reach a "peak" quickly and put an efficient "brake" on the infecting organisms. In hospital this is done by injections at stated regular intervals.

In the past, treatment of ambulant patients has, for this reason, been very difficult and various methods were devised in order to delay the absorption of the penicillin so that the desired blood level would be maintained, e.g. oil and/or beeswax suspensions.

These preparations of penicillin have the disadvantage of viscosity in cold weather making injection difficult even with a wide bore needle, also they cause pain which may last for some time at the site of the injection (Peacock and Gillespie, 1950).

A newer preparation is procaine penicillin

in arachis oil with 2 per cent aluminium monostearate plus crystalline potassium penicillin G.

This gives effective blood levels for the twenty-four hours, but as it is an oil preparation, again difficulty in administration may be encountered.

A further advance in penicillin therapy is the aqueous suspension of procaine penicillin which is stable and is injected without difficulty, giving satisfactory levels for twenty-four hours. It is issued in the dry state in suitable vials and the suspension is easily and conveniently prepared by injecting sterile water and shaking the vial. The same volume of air as the dose is injected into the vial before withdrawing the dose. This is *not* for intravenous injection.

Procaine penicillin is the subject of an interesting article by Fairbrother and Daber (1950).

Application.—These preparations of penicillin are most useful in cases of acute infection or for giving the injection as a penicillin "umbrella" before undertaking extractions of infected teeth in cases of rheumatic heart or congenital cardiac lesions, or in any case in which the condition is sufficiently severe and the patient shows signs of toxic absorption—the object being to limit and control the "spray" of organisms liberated into the blood stream by the operation and any possibility of bone infection due to trauma.

The penicillin (300,000 units procaine) should be injected about one to two hours before the operation. In my experience a large dose is essential as the "umbrella" to be effective *must* be adequate to deal with the liberated organisms and be maintained for twelve and preferably twenty-four hours. The dose should not be less than 100,000 units and may reach 500,000 units. It is pointed out that these various suspensions can all be contained in 1 c.c.

It is fortunate that penicillin is virtually non-toxic, it is active in high dilution and places no burden on the already overtaxed vitality of a very sick patient. Furthermore, it is active in the presence of blood, pus, autolysed tissue or peptones, in this respect comparing favourably with the sulphonamides.

Ungar, J. (1943) and Bigger, J. W. (1944) have shown the synergistic effect of the sulphonamides when combined with penicillin therapy—their combined action being more effective.

This I can confirm from my own experience as I treat all acute infections at the Birmingham Children's Hospital with penicillin and sulphonamides, and of the latter a mixture of three sulphonamides. This "mixture" will be referred to in the section on sulphonamides.

Sensitivity.—Reactions to penicillin are fortunately now somewhat rare, though one does still come across a patient who cannot tolerate penicillin (as shown usually by a skin reaction, which happily in most cases responds to anti-histamine therapy). It is now maintained, that as sensitivity is found to be considerably less, that the cause lay not with the penicillin itself but with the impurities contained therein. Improvement in manufacture has eradicated the impurities, thereby reducing the undesirable sequelæ.

On the other hand, sensitivity may occur in the form of an allergic reaction—the sensitivity being due in some cases to a previous inadequate dosage—producing erythematous eruptions, muscular and, sometimes, joint pains, and in rarer instances asthmatic attacks.

Fortunately, as stated, relief is usually produced by the anti-histamine drugs given by mouth, *e.g.* Benadryl 25 to 100 mg. (2/5 to 1½ grains) capsules; Anthisan 50 to 100 mg. (¾ to 1½ grains) in tablets, etc.

The itching is best controlled by a soothing lotion such as lotio-calaminæ B.P.

Site and Method.—The penicillin injection must be administered with strict asepsis, preferably with an all-glass syringe, and particular attention should be paid to the cleansing of the syringe after the injection. The skin at the site should be cleansed with ether or spirit.

This is an intramuscular injection, so a needle with a wide bore and of sufficient length should be chosen so that it will not be necessary to insert the whole of the needle in order to reach the required depth of muscle. This is important in that if the needle should, unfortunately, break (usually at the hub) there will be enough needle left protruding to facilitate its removal.

The site least likely to cause injury to nerves or vessels is the outer side of the thigh, into the vastus externus muscle, at the junction of the upper and middle third. It is apt to be a little painful as this is a difficult muscle to relax. The deltoid and triceps are both accessible but the most favoured site is the buttock, alternate sites should be used if several injections are required.

Muscle relaxation is improved if the patient is lying on a couch face downwards and the injection should be given on a line from the great trochanter to the third sacral vertebra at a point above the junction of the middle and posterior thirds of this line, thus avoiding the sciatic nerve which can be injured if the penicillin is injected too near to it and sterile abscesses are known to occur in muscle. The ill-effects of the various penicillin suspensions (injections) upon nerve and muscle is admirably shown by the investigations of Holbrook and Pilcher (1950).

Perusal of their article should dispel the familiarity leading to contempt and carelessness referred to earlier in this paper.

Finally it is stressed that the administration of penicillin should be continued past the point when recovery appears complete in order to be sure that all the causative organisms have been eradicated. If this is not done and some organisms survive, the infection may flare up again or sensitivity to penicillin be established, and the enzyme penicillinase be formed, thereby destroying the activity of the penicillin.

Systemic penicillin is not meant to replace surgery but it should be used in acute infections, as it is of great help in that it localises the infection and surrounds it with a protective barrier, and in due course surgery can be used with more effect and with quicker results.

I have on several occasions withheld the knife for several days and have been duly rewarded by better localisation of the infection. In a few cases penicillin was so effective against that particular strain of organism that the condition completely resolved without surgical interference.

Oral Administration

Lozenges, Pastilles, Chewing Gum.—These contain 500 or 1,000 units. The pastille is now more favoured as it lasts longer in the mouth and gives a more even liberation of penicillin.

Administration is two-hourly up to 6 or 8 a day. I have found that if the lozenge/pastille is alternated at the two-hourly intervals (i.e. one hour between the different tablets) with a sulphonamide (sulphamezathine grm. 0·25) a much quicker result is obtained from this combined attack.

I would again emphasise that the lozenge/pastille should be given every opportunity to do its work by the careful removal of an "obstruction" such as tartar, sloughs, etc.

These preparations if kept in an airtight container will remain effective for two to four months at room temperature but moisture causes rapid deterioration.

Cones

Cones containing 1,000 or more units, usually with ½ grain each of sulphathiazole and sulphanilamide, are useful in the treatment of septic sockets, the drawback being the effect on blood coagulation and clot retraction as shown by Fleming and Fish (1947). A warning is necessary with regard to sensitivity and sunlight referred to later on in this paper.

Solutions

1 c.c. of a solution containing 5,000 to 10,000 units per c.c., retained in the mouth for fifteen minutes or longer, gives a greater concentration than the lozenge/pastille and is useful in treating Vincent's angina but, of course, is not so convenient and needs supervision (Webster, J. F., and Frey, H. 1947).

Powder

Powder 1,000 to 5,000 u/grm. is useful applied by means of an insufflator, but mainly in oral surgery, bearing in mind the reference to the interference with the blood coagulation.

It cannot be emphasised too strongly that penicillin lozenges should not be used indiscriminately for trivial reasons, and it should be realised that it is possible by using penicillin lozenges/pastilles casually to produce resistant strains by the *incomplete* use of the drug.

Two dangerous sequelæ follow—these resistant strains may be inhaled by the patient into the lungs or be passed on to another person with serious consequences as treatment with penicillin will no longer be effective.

Some cases acquire severe oral reactions such as acute stomatitis which is very painful with excessive salivation, others have a condition known as "black tongue"—the tongue presenting an alarming appearance being black in colour. In these cases the lozenges/pastilles should be discontinued and if the condition does not clear up, I have found that vitamin B_1, such as Benerva (Roche) 3 mgm. t.d.s. or vitamin B complex, such as Becosym tablets 1 t.d.s. for one or two days usually relieves the condition.

It is thought that these reactions are due to a disturbance of the equilibrium of the flora of the mouth brought about by the selective action of the penicillin (MacGregor, A. B., 1946). Finally, of the fortunately few organisms found in the mouth which are *insensitive* to penicillin, one is the Gram-negative yeast *Monilia* (*candida*) *albicans*, the causative organism in "thrush," therefore do not treat this condition with penicillin in any form as it responds to iodine or gentian violet.

Sulphonamides

Compared with those of penicillin the uses of the sulphonamides are limited. Their action is impaired in the presence of pus, blood or serum. They are potentially dangerous and may cause crystalluria, whereas penicillin is safe and practically non-toxic. Also allergic reactions are more frequent and may be serious.

The sulphonamide compounds are less effective than penicillin in staphylococcal, streptococcus viridans and non-hæmolytic streptococcal infections, but they are not destroyed in the stomach.

In the oral cavity they can be used alone or in conjunction with penicillin by adding ½ grain of a mixture of sulphathiazole and sulphanilamide in each cone of penicillin for septic sockets or as already referred to for oral infections a 0·25 grm. lozenge alternated with a penicillin lozenge of 500 or 1,000 units.

Systemic Use.—Experience at the Birmingham Children's Hospital has taught us to use a triple sulphonamide mixture and in acute infections this is always given in conjunction with penicillin.

The advantages claimed for this mixture are that the one sulphonamide enhances the action of the others, also, and even more important, there is less risk of crystalluria as the presence of one sulphonamide in the urine does not interfere with the solubility of the others and the dosage is not affected.

This triple sulphonamide is on the market under the trade name of "Sulphatriad" (M & B) and is a mixture of sulphathiazole 0·370 grm., sulphadiazine 0·370 grm. and sulphamerazine 0·260 grm.

It is employed by oral administration for the same purposes as its constituents, and is available in tablet form 0·50 grm. or in suspension (4 c.c. = teaspoonful of suspension = the tablet).

Dosage.—As in the case of penicillin it is important to begin treatment early in order to obtain quickly a concentration of the sulphonamides in the infected tissues and so bring about bacteriostasis, and avoid the formation of resistant strains. The action of sulphonamides is enhanced at fever temperature. Treatment is, therefore, commenced by giving a large initial or "loading" dose of 2 to 4 grm. (adult) followed by 1 to 2 grm. at four-hourly intervals usually up to a maximum of 30 grm.

Dosage is sometimes based on body-weight but it must be borne in mind that the younger the patient the greater the tolerance.

Infants (1–2 years) 1 grm. per 5 lb. body-weight.

Children (2–12 years) 1 grm. per 10 lb. body-weight.

Adults 1 grm. per 20 lb. body-weight.

Precautions

A much increased fluid intake is essential in order to lessen the possibility of crystal formation in the kidneys and it also reduces the possibility of nausea. At least 1 litre of urine should be passed *per diem*. Lastly it must be remembered that there is a likelihood of skin sensitivity. The blood may also be affected—producing aplastic anæmia or agranylocytosis.

It will be realised, therefore, that the greatest care is necessary when using these potentially dangerous drugs. Systemically they give remarkably good results in prophylaxis against the spread of infection in alveolar abscesses, cellulitis and disease of bone, such as osteomyelitis, but, if at all possible, this type of case should be hospitalised.

Again, as with penicillin, the sulphonamides do not replace surgery but are of great assistance in limiting the area of the infection.

Sulphonamides should not be administered for a longer period than eight to ten days. If no result is produced in the first seventy-two hours the chances are that the organism is resistant. Finally, and this is *most* important, patients undergoing sulphonamide therapy, however mild (e.g. root canal dressing), should be warned against exposing the skin to strong sunlight as the skin becomes sensitised and alarming rashes may develop which are intractable and may persist up to eight weeks.

Dyes

Two dyes which are worthy of consideration, being relatively safe in use and also having powerful antiseptic properties, are proflavine and gentian-violet.

Proflavine (proflavinæ sulphas) in a strength of 0·1 per cent in normal saline is an active bactericide even in the presence of serum.

It is recommended in preference to acriflavine, being more compatible with normal saline, less irritant and less toxic.

It is worth remembering that proflavine has a hæmostatic action, so for that reason and for its "gentle" and healing properties it is my dressing of choice in oral surgery. I use it in a strength of 1 : 1,000 in water, except for the skin in pre-operative preparation when I use 1 : 1,000 in spirit. As a dressing it appears to lose its efficacy when granulation tissue is well established.

Tablets and lozenges of proflavine are put up in a strength of 3 mgm. These are effective in cases of stomatitis, gingivitis and useful in Vincent's angina, the dose being one tablet sucked every two hours up to 6 to 8 daily. Proflavine is a potent dye and as it is eliminated by the kidneys it stains the urine deep yellow, therefore care should be taken to avoid soiling the underclothing.

Prior to the advent of penicillin, proflavine was my "stand by" and I still use it for the milder oral infections.

A few patients have an idiosyncrasy to flavine, a reaction being set up in the form of a skin rash. If this occurs the treatment with flavine

should be stopped. It might be worth mentioning here that a similar reaction occurs in some patients when they are treated with iodine or mercury, usually when these are employed as dressings.

Gentian-violet is also a powerful antiseptic used in 1 per cent aqueous solution in gram-positive infections, fungal infections such as " thrush " and as a last resort in virus infections, especially of the herpetic type, as nothing else appears to affect them so well.

It can be used as a mouthwash in an aqueous solution of 1 : 10,000. Care should be exercised in its application as the stain is powerful and penetrating.

Other Useful Drugs

Sodium Hypochlorite (*Milton*).—This is a very safe medicament and is most useful for irrigations in the mouth especially when " cleaning up " is necessary. It has the property of dissolving away necrotic tissue by breaking it down and thereby permits better penetration.

It is relatively innocuous when used at the stated dilutions (Milton 1 : 8 in water equals sod. hypochlorite 1 : 800).

It is active against practically every organism but has one slight disadvantage in that it cannot be used as a hot lotion because the chlorite breaks down. It can, however, be used slightly warm.

The makers of the proprietary brand "Milton" market an ingenious irrigator in rubber, rather like a lower impression tray with a tube attached (instead of the handle) which in turn is connected to a Higginson syringe. It is claimed that this method controls the flow of the liquid effectively if it is placed in position over the teeth as one would an impression tray. The parts are detachable and boilable.

If this is not available a most effective apparatus is the Higginson syringe with an antrum canula attached. The bend at the distal end of the canula enables the operator to reach all parts of the mouth with ease. By using the Higginson syringe the irrigation can be relatively continuous and gentle or forceful at will. The patient should hold a kidney dish under the chin so that the lotion cascades into it—i.e. no stopping and spitting.

T.C.P.—A solution of halogenated phenolic bodies in water containing chlorine 4 per cent, iodine 0·11 per cent, bromine a trace, phenol 0·63 per cent, salicylic acid 0·045 per cent with the partial elimination of the ionisable halides.

This is an excellent antiseptic for hot irrigations. It is bland and soothing, and promotes healing. Used in a strength of 1 : 8 it is innocuous if swallowed.

Iodine has been with us for so long, being found in every bathroom cupboard, that it is apt to be regarded as a mild and simple antiseptic, and therefore not used as extensively as it might be.

I use it in young children and indeed in infants with gingivitis, also in pregnant women. The excellent results produced are due to three factors—the iodine preparation, the simplicity of the technique, and the psychological reaction.

The parents are instructed to make a solution of iodine (from the bottle in the bathroom!) by adding drops of iodine to a glass of hot water until the water is a deep " straw " colour. Then to dip pieces of clean gauze in the iodine solution and thoroughly cleanse the mouth of the child after each feed/meal, using several pieces of gauze as instructed—the massage produced by this mode of treatment is in fact a reason for its success. Pregnant women are advised to clean their own mouths in the same way.

This line of treatment is particularly applicable in the type of case referred to earlier where the treatment of the toxic absorption is so important.

Anti-histamines are worthy of consideration as they have proved effective in one of the most intractable of oral condition, namely idiopathic ulcers.

These ulcers are small in size and extremely painful, allergic in origin, sometimes familial and often associated with worry. Happily they respond to the anti-histamine preparations and in my own experience patients have responded to " Benadryl." This treatment is far superior to the old method of painting the ulcers with pure phenol or silver nitrate.

Potassium Chlorate. Tabs. 5 gr.—These are useful in aphthous and mercurial stomatitis. The saline taste excites salivation and the chlorate is excreted by the oral mucous glands. In toxic doses chlorates can convert oxyhæmoglobin into methæmoglobin which is excreted in the urine, i.e. hæmoglobinuria with cyanosis. As these tablets are often prescribed with some degree of impunity and as they are regarded by patients as being innocuous it should be realised that 30 × 5 grains tabs. are toxic and 45 × 5 grains are *fatal.* A death from poisoning by potassium chlorate tablets was reported recently.

Control of Hæmorrhage

It is not intended to deal with this subject in full as it would need a paper to itself but I feel I must mention two preparations which are very useful in the control of hæmorrhage. I am prepared to admit that there are others probably more effective, such as Fibrin-foam, but from the point of view of the Public Dental Service,

especially in the counties, factors such as convenience, procurability, etc., have a bearing on the choice. The two preparations are :

Sodium Alginate.—This is obtained from the Laminaria seaweed. When applied in a 1 per cent solution to raw tissues it is precipitated as calcium alginate which acts as a hæmostatic and is later absorbed. For dental use surgical gauzes and wools are available made from calcium alginate fibres and put up in sterile containers. The technique is to clear the offending socket and plug with the gauze or wool which is then left in situ and is slowly absorbed.

Oxycel.—I have no personal experience with the alginates but extensive experience with " Oxycel," i.e. oxidised cellulose. It is prepared by nitrogen dioxide oxidation of cellulose into cellulosic acid.

It is available as gauze and wool and for dental purposes I use the wool. It is effective and forms a coagulum, black in colour, presumably of the salts of cellulosic acid with hæmoglobin. It is used as a plug, and Dilling (1950) states that it may be dipped in sulphathiazole powder.

I have used it alone in a large number of cases of " bleeders " with good effect, though on occasion in a difficult case I have sutured the plug in the socket.

It is my experience that it acts more efficiently if put in early into a " virgin " socket. I found it less effective when the socket had been " disturbed " by other less effective methods before being referred to me, further, the longer the interval since the extraction the more difficult the arrest of hæmorrhage—the blood seems " thinner " and the local factors so necessary for coagulation have, as already stated, been " disturbed."

Even so, it is a most useful preparation, but for security—SUTURE.

Snake (viper) venom.—I had extensive experience with this preparation from its introduction up to 1939 but I no longer use it as it is uncertain in action, and in my opinion has been superseded.

Summary

An attempt has been made to emphasise the potency of the antibiotics and sulphonamides with a warning in regard to familiarity leading to the lack of the necessary precautions.

Attention is drawn to the desirability of using the older preparations and reserving the newer, such as the antibiotics, for the acute cases.

An appeal is made not to " dabble " in prescribing therapeutic agents but to make certain of the diagnosis in the first instance, then of the action, side effects and correct dosage of the preparation used.

The purpose being to deal with the practical application of therapeutic agents, their chemistry, pharmaceutical properties, etc., are not discussed.

A plea is made for reducing the " load " the preparation has to carry by removing the toxic or obstructive matter whenever possible.

The selected therapeutic agents are dealt with in regard to their application to the Public Dental Service as follows :—

Penicillin, sulphonamides, and synergism.

The dyes, proflavine and gentian-violet.

Irrigations, sodium hypochlorite (Milton) and T.C.P. and their method of application.

Iodine is advocated for its efficacy in certain oral conditions.

The anti-histamine drugs are recommended for their action on the idiopathic ulcers in the mouth.

Potassium chlorate in tablet form is also advocated for use in the more mild cases with a warning with regard to its toxic properties.

The control of hæmorrhage by the newer preparations, the alginates, Oxycel and snake (Viper) venom is briefly discussed.

Acknowledgment

The author wishes to acknowledge the help given by Mr. A. E. Marston, Chief Pharmacist at the Children's Hospital.

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SHORT COMMUNICATIONS

CHONDROSARCOMA OF THE MAXILLA

By Professor P. J. STOY, B.D.S., F.D.S. R.C.S.Eng.

In a recent contribution (Miles, 1950) a review of the literature on chondrosarcoma of the maxilla has been given and the pathology of the condition discussed. As this type of tumour would appear to be extremely rare, the following case is reported :

A married woman, aged 41, first reported eight to nine years ago—at that time giving a history of a swelling in the right upper lateral region of four to six years' duration. On clinical examination the $\underline{2}|$ was found to be missing, possibly having been loosened and exfoliated of its own accord, and there was considerable swelling in that region limited to the area $\underline{321}|$. A biopsy was done, the report being " Tissue consists mainly of bone trabeculæ in a fibrous tissue stroma with surrounding islands of cartilage beneath the gum. The tumour is an osteochondroma and is quite benign." Treatment decided upon was the removal of $\underline{1}|$ and $\underline{3}|$, the patient to be kept under observation.

She first came under my observation on 29.12.48, when she was readmitted to hospital complaining of a return of the swelling and of having noticed an area of thickening around the lower part of the nose two months previously. This thickening had increased inwards and was progressing in extent. The general health was good and there was no history of upper respiratory tract infection. On examination a small smooth indurated area extending forwards from the maxilla was found, fig. 1

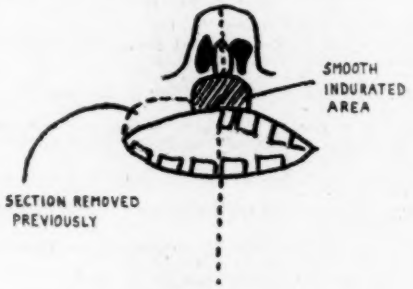

Fig. 1.

(which also shows area of tissue previously removed). $|\underline{34}$ were still standing and firm. Radiographs (fig. 2) revealed in the mid-line a lobulated opaque area the size of a farthing. Radical removal was the treatment decided upon and this was done on 3.1.49 by Mr. J. S. Loughridge, F.R.C.S. The tumour was completely excised, an opening into the nose being

Fig. 2.

necessary ; the teeth, however, were left standing. The surface of the cavity was allowed to granulate and at a later stage, an obturator, carrying the missing teeth, was fitted. Periodic follow-up examinations were made on 9.11.49, 3.3.50 and 3.10.50, and as yet there is no sign of recurrence.

Pathological Report.—" Tumour composed of sheets of cartilage which in most areas are well formed (fig. 3, A) but which show an actively growing cellular margin (fig. 3, B). There are areas of

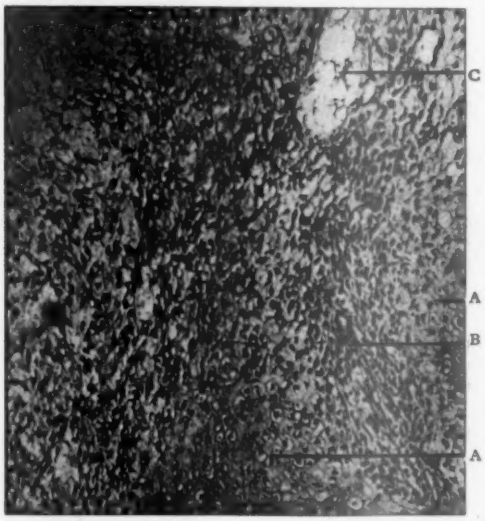

Fig. 3.—A, well defined cartilage; B, actively growing; C, mucoid change.

bone and calcified osteoid through the tumour and a tendency in some parts to show mucoid change (fig. 3, c). The appearance is that of a chondro-sarcoma."

I am indebted to Dr. E. F. McKeown for the pathological report and to Mr. D. M. Mehaffey, A.R.P.S., for the photomicrograph.

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TREATMENT OF DIASTEMA BY JACKET CROWNS

By ADRIAN COWAN, M.B., B.Ch., B.Dent.Sc. Dubl., F.D.S. R.C.S.Eng.

Miss N. C., aged 26, was referred for treatment of a very wide diastema. Examination revealed a space of 5 mm. between the $\overline{1|1}$. All the upper anterior teeth were hypoplastic (fig. 1).

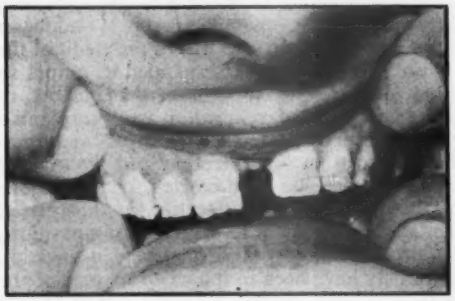

Fig. 1.

It was decided to make jacket crowns for $\overline{321|123}$ and to use up the space between $\overline{1|1}$ by dividing it between the other anterior teeth. In this way it was possible to reduce the division to $1\frac{1}{2}$ mm. without making the resulting teeth noticeably wider than the originals.

The method adopted was to carve the jacket crowns more on the distal side, and build out the mesial so that the individual crowns were " moved " centrally, as illustrated by the dotted lines in fig. 2,

Fig. 2.

without overlapping the shoulders of the root preparations. The contour of the distal side of each tooth was almost straight, while mesially it was a smooth convexity.

The final result was æsthetically and functionally satisfactory (fig. 3).

Fig. 3.

The case is reported since the treatment of the relatively common and unsightly spacing might be of interest.

I am indebted to Mr. E. R. Roberts for the photographs.

Orthodontic Note

Some Considerations on the Diagnosis of Malocclusion Relative to Extraction

The presence of malocclusion is not a life and death matter ; its correction can be dictated only on a reasonable basis for the most part psychological rather than physical. The orthodontist is a specialist superimposed, and greatly dependent, upon a highly developed civilisation and he serves to make a tolerable situation better, and in a civilisation such as ours, the orthodontist is assuming a very important role. For example, the periodontist asks for a well aligned dentition to help in maintaining healthy supporting structures ; the increasing requirement of the human dentition is for appearance.

That the removal of teeth makes treatment easier is fallacious. If the patient does not demand idealism, the orthodontist may leave slight discrepancies and still provide a satisfactory dentition. There is a large group of border line cases in which the place of extraction in treatment is difficult to decide. The most important requirement is for the orthodontist to recognise the relationship between the teeth, the dental arches and the supporting bone ; within the limitations of growth the apical base is a fixed relationship. The dental arch is more variable and can be modified within the limits of its supporting alveolar bone and apical base. We are obliged to work within the confines of the individual arch form which means teeth and alveolar bone ; consideration of these is of major importance. Arch form is strongly dependent upon heredity with a general dominance of constricted arches over broad ones. When the long tapering arch is present in one parent we do not try to develop the dental arch to greater limits. Treatment probabilities hinge upon our ability to manage malocclusion within the bone which supports it. The frequency with which extraction will be used will depend to a great extent upon the nature of the results required. Extraction is not a short cut since it almost always superimposes dental responsibilities for the management of space.—Cheney, E. A. (1950) *Amer. J. Orthodont.*, **36**, 19.

BRITISH DENTAL JOURNAL
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DENTAL GOODS

AN Order has been laid before Parliament which, if approved by both Houses, will make the collective enforcement of the re-sale prices of dental goods unlawful. This Order gives effect to one of the main recommendations of the Report of the Monopolies Commission on the sale of dental goods, and it seems probable that the only ground on which it will be opposed is that it is wrong to deal with price maintenance by individual Orders applicable to particular industries rather than by general legislation covering the whole field. That is a political question on which opinion may well be divided. It will be remembered that two members of the Commission made a reservation on this very point, and suggested that it would be wrong to enact *ad hoc* legislation against the dental industry, although they would not recommend that it should be exempt from any general legislation. It is important to note that the Order "leaves untouched the right of an individual to fix and enforce retail prices in respect of goods which he manufactures or imports." There is, apparently, a considerable measure of doubt whether individual firms have at their disposal any effective powers with which they can compel dealers to maintain the prices they fixed for their goods. The Association of Dental Manufacturers and Traders indeed held that collective action was essential if this right was to be maintained in practice. Since, however, the A.D.M.T. have already undertaken voluntarily to revise their rules, so as to give effect to the recommendations of the Commission with regard to exclusive dealing and the collective boycott, this aspect of the question is now of general rather than particular interest.

It is easy to argue that free unrestricted competition must, necessarily, be good both for manufacturers and consumers. Experience has, however, shown that this is by no means always the case and that on balance the consumer, equally with the manufacturer, stands to gain rather than to lose by the fixing of retail prices at a level which will leave the reputable dealer with a fair margin of profit. Price cutting carried too far can be the enemy of quality. On the other hand, a monopoly, or even a quasi-monopoly, can very readily act as a brake on progress. The profession is more concerned with the maintenance and improvement of the quality of the equipment and goods which it uses than with their cost, although it would be hypocritical to pretend that its members are altogether indifferent on the latter score. The war, and the economic position, which was its aftermath, have imposed irksome restrictions on the freedom of practitioners to purchase supplies and equipment from abroad, in particular from America. This created a situation in which it would have been easy for British manufacturers to adopt a complacent attitude, and it is to the credit of the industry that it not only expanded its output so as to meet the increased home demand but, at the same time, developed a very substantial export market under competitive conditions. Their success in this direction and the assured demand which has been created for their goods by the operation of the Health Acts has placed dental manufacturers in a very strong position: so strong, indeed, that whatever justification there may have been in the past for some of the restrictive rules of the A.D.M.T., they should now have little or nothing to fear from their abrogation and a return to free competition among manufacturers and traders alike. It is clearly in the interest of the profession that its members should have the widest possible area of choice in purchasing materials, although this must necessarily still be restricted to some extent by considerations of national economy, and that no reputable dental trader should be prevented from purchasing supplies in an open market.

A good deal has been made in Parliament of the possible reduction in the cost of the Health Service which might be expected to result from the operation of the new Order. It is very easy to exaggerate on this score. The evidence given to the Monopolies Commission suggested that the cost of dental goods supplied to practitioners was roughly equal to ten per cent of the gross payments made to them by executive councils. It is clear, therefore, that, quite apart from any possible adverse effects which may arise as a result of the general inflationary tendency, any saving will be comparatively small in amount—especially as price reductions will almost certainly

be restricted to a limited range of goods. It will not be overlooked in this connection that, since the greater part of the expenditure on dental goods in the Health Service is that incurred by dentists in the general dental service, any saving in this direction can only be made by means of a reduction in the scale of fees, corresponding in amount to that effected in practice expenses. This, again, may well be swallowed up by increases in other items of expenditure directly attributable to the depreciation in the value of money.

In general, it can be said that the profession will welcome the abolition of restrictions which have hampered the free play of competition in the dental trade, whether it is effected by the voluntary action of the traders, who have already shown themselves responsive to public opinion on this issue, or by the enactment of the proposed Order. The overriding concern of the profession is, as we have already said, with the quality of the goods with which it has to work, and its members would feel easier about the possible effect of unrestricted competition if there was in existence a bureau of standards, similar to that which has been in operation in America for many years past.

NOTES AND COMMENTS

The Salaries Settlement

WHEN the award of the Industrial Court on the claims of medical officers for increased salaries was announced, three months ago, it was obvious that it would have considerable, if not decisive, influence on the negotiations for a scale of salaries for dental officers employed by local authorities. The disappointing nature of that award clearly showed that a similar reference to the Court with respect to dental salaries was unlikely to meet with any greater measure of success. In these circumstances the staff side of the Dental Whitley Council (Local Authorities) were constrained to make the best settlement that could be secured by direct negotiation. In the result, under the terms of the agreement which has been reached, the great majority of dental officers in the service of local authorities will receive increases in their salaries dating back to October 1, 1950. The extent of those increases will vary within wide limits according to the rates of salary at present in operation for individual posts and the length of service and experience outside the service of each officer. It is, however, estimated that on average the maximum salary payable to a dental officer will be £300 per annum greater than that previously obtainable. It is recognised in the scale that a dental officer has not the same prospect of attaining to a higher post as that open to an assistant medical officer. On this account the maximum salary of a dental officer has been fixed at £100 greater than that of the assistant medical officer. It is also to be noted that each dental officer is to be placed at the point in the scale which he would have reached if the scale had been in operation at the time he was appointed. Thus some small measure of tardy justice is to be meted out to the officers who have remained in the service. A point of interest in regard to recruitment is that local authorities have discretion in fixing the commencing salary of a dental officer to allow one increment of £50 per annum for each year of experience in practice up to a maximum of five years, so that a dentist who had been qualified for that length of time could be appointed at a salary of £1,050. It must, nevertheless, be recognised that, welcome as these improvements will be to officers in the service, it is unlikely that they will have any appreciable effect on recruitment to the service. The most that can be hoped from them is that they may arrest the decline in the number of school dental officers—a negative result which will contribute little or nothing towards the establishment of a satisfactory priority service for children and expectant and nursing mothers.

Retirement of Sir William Douglas

THE Ministry of Health announce that Sir William S. Douglas, *G.C.B.*, *K.B.E.*, Permanent Secretary of the Ministry, is retiring from the public service on April 30. Since entering the Custom and Excise Department in 1914, Sir William has occupied a wide variety of posts, including that of Assistant Secretary, 1935–37 ; and Secretary, 1937–39, Department of Health for Scotland. He became Permanent Secretary to the Ministry of Health in 1945 and as such was intimately concerned with the organisation of the National Health Service and in particular with the negotiations with the professions. He is to be succeeded by Mr. J. M. K. Howton, *C.B.*

New Dental Schools

THE need to increase the number of dental students is now widely recognised. Progress in this direction is, however, lamentably slow. It is for instance six years since the Teviot Committee recommended that the possibility of establishing a dental school at Cardiff should be explored as soon as possible. There now appears to be some possibility that the plans for the new teaching hospital and medical school at Cardiff will include provision for a dental school and the Minister of Health indicated in reply to a Parliamentary

question on March 21 that he would be glad to consider any proposals for the establishment of a national dental school for Wales in conjunction with the scheme for the 1,000-bed teaching hospital at the Heath, Cardiff. This, at best, will be a long-term project since it is unlikely that the new hospital can be completed for at least eight to ten years. There can be little doubt that the establishment of a school in Wales would result in an increase in the number of Welsh students over and above those who would otherwise have gone to schools in England.

The Lindsay Portrait

WE are asked to intimate that the fund which is being raised to present Dr. Lilian Lindsay with her portrait will be closed on April 30. Mr. T. C. Dugdale, R.A., has accepted a commission to paint the portrait and it is hoped that the presentation will take place during the Annual Meeting of the Association in London in July. Subscriptions to the fund should be addressed to Mr. W. Shearer, 62, Oxford Street, Wellingborough, Northants—envelopes being marked "Lindsay Portrait."

Benevolent Fund Legacy

THE Benevolent Fund of the Association has received a legacy of £50 under the will of the late Mr. H. R. Napp. Mr. Napp was a manufacturing chemist, his address being given in the London telephone directory as 3, Clements Inn, W.C.2. So far it has not been possible to trace whether Mr. Napp had any direct connection with the dental profession and the Chairman of the Benevolent Fund would be glad if any member could supply him with any information which might throw light on the reasons which prompted Mr. Napp's generous action.

Fifty Years Ago

From the "Journal of the British Dental Association," April 15, 1901.

Too much stress cannot be laid on the value of a dentist in identifying remains which have been subjected to fire or water, as the result of accident or shipwreck. The late Prince Imperial's body was so disfigured that absolute proof rested on fillings in the first molar and incisor teeth. Similarly, after the great fire at the Charity Bazaar in Paris, the Duchess d'Alencon's body was recovered, and these, by no means isolated instances, should suffice to show the necessity for keeping a correct register of our conservative work, to provide if necessary a correct, unerring and unalterable piece of evidence.

LETTERS TO THE EDITOR

THE ROLE OF SALIVARY AMMONIA IN DENTAL CARIES

SIR,—We are very much indebted to Dr. Kesel and his colleagues for sending us a copy of their letter to you dated February 22, 1951. We feel that this courtesy permits us to take an early opportunity of clearing up a number of points which our American colleagues raised.

We are prepared to agree that there is some confusion in our minds about the studies of Kesel *et al.*, but feel that this is due to contradictory statements and lack of essential details in their published works. In retrospect we are inclined to agree that it might have been better to have written to these workers to ask for more information about their techniques. We do feel strongly, however, that scientific workers are obliged to publish all essential details about their experimental methods as well as sufficient data to enable others to judge the significance of their results.

We much regret that we had not seen the paper of Kesel *et al.*, published in *Oral Surgery, Oral Medicine and Oral Pathology*. Among the tables of this paper are four columns of figures representing the ammonia production in samples of saliva, from caries-active and caries-free subjects, after eight days' incubation without broth. The averages of the figures are not given, nor are they statistically analysed, but it is stated that "saliva collected from caries-active individuals produced somewhat *more* ammonia than did caries-inactives" (our italics). The fact that this conclusion contradicts the previous statements of these authors is not pointed out, nor is their conclusion mentioned in the summary of their paper.

We are therefore pleased to find that our results are in substantial agreement with the figures of Kesel *et al.*, and that presumably they no longer believe that saliva from caries-free subjects produces more ammonia during eight days' incubation than that from caries-actives. We are uncertain, however, whether Kesel *et al.* accept as a final conclusion these figures or the (unpublished) figures upon which they base their previous opposite conclusions published in several papers (e.g. *J. Amer. dent. Ass.*, **33**, 695) that caries-free saliva produces more ammonia in incubation than caries-active.

We are still uncertain about the views of Kesel *et al.* on the ammonia production during incubation of saliva with broth. Also in the paper in *Oral Surgery, Oral Medicine and Oral Pathology*, just referred to, are two graphs showing the daily ammonia production during eight days' incubation with broth of only two samples of saliva, one caries-active the other caries-free. The final concentration in both at eight days is the same, but the caries-free saliva produces considerably more ammonia during the first three days of the incubation. This result resembles ours in the most important respect (namely ammonia concentration is the same in both after eight days' incubation), but the actual concentrations are higher and we have found no difference at any time during the incubation. This result is clearly at variance with their previous findings, and we are not told which result they finally accept.

Such a point can only be established by collecting data from as large groups as possible and if a difference in ammonia concentration is found the significance of the difference must be determined by statistical analysis.

To change an opinion in the light of new evidence is one of the greatest privileges and also one of the heaviest responsibilities of the man of science. Among the responsibilities is an obligation to make clear to fellow

workers when an opinion has been changed. We feel that Kesel *et al.* have not yet made it fully clear that they have changed their opinion, nor have they given data from which it is possible to decide how wide a change of view they have made.

We apologise for the slight misquotation on p. 262 of our paper, in which we refer to 50 mg./100 ml. ammonia instead of ammonia nitrogen. We would like to point out that on the previous page we correctly quote the figure 0·5 mg./ml. ammonia nitrogen. In any case the difference is numerically small and in no way affects the main issue of our paper. If this concentration of ammonia fails to inhibit *Lactobacillus acidophilus* when present in amounts greater than 50 organisms per ml. it could not be expected that even their maximum published amount (1·05 mg./ml.) would have any significant effect in the mouth where the number may be more than a million organisms per ml.

Our experiments on buffered and unbuffered beef broth were designed merely to test the possibility that our failure to detect differences in ammonia production was due to the absence of buffer from our beef broth. We did not wish to imply that our results contradicted the effect of buffers which Kesel *et al.* found.

In connection with the reference of Kesel *et al.* in their letter to the amounts of saliva we added to broth (1 ml. to 10 ml. and 1 ml. to 100 ml.) we are pleased to learn that these concentrations are not greatly different from that which our American colleagues used, i.e. 1 ml. to 50 ml. Now that we have been given figures for the concentration of ammonia present after eight days' incubation of broth saliva mixtures, we are surprised that they are so much higher than the concentrations we found and can offer no explanation of this difference.

We are surprised that Kesel *et al.* use the acidophilus count as a criterion of freedom from caries as they have clearly shown in other papers that this test is far from conclusive in detecting caries-free subjects, although it undoubtedly indicates the general trend. To regard absence of acidophilus from saliva as synonymous with freedom from caries seems to us to be a confusion of fact with hypothesis.

We agree that the fall in pH observed in the single experiment on 6 filtrates quoted in our Table V is smaller than usual, indicating that the particular saliva sample used had a smaller number of acidogenic organisms than is usually present in caries-active saliva. This circumstance should, however, have made the saliva more sensitive to the inhibitor which Kesel *et al.* believe to be formed during the incubation of caries-free saliva with beef broth. The average fall in pH of 13 salivas given in our Table VI is more typical and the final figures (4·11 and 4·09) agree well with those found by Kesel *et al.*

We did not wish to refer disparagingly to the 0·28 per cent glucose concentration used by Kesel *et al.*, but merely gave reasons why we preferred a higher concentration. We are still puzzled by the continued fall of pH between twenty-four to twenty-eight hours' incubation as this is quite contrary to our experience. We wish to emphasise, however, that the concentration of glucose is irrelevant to the main issue, namely whether the ammonia production and inhibiting power of caries-active and caries-free saliva differ after incubation.

With regard to the " well " tests, we agree that little could be concluded from them and have already given our reasons for this in our paper (p. 205). The method we used was the standard technique used by many workers—in particular by Bibby and his colleagues.

Differences of opinion are inevitable and not altogether undesirable in the progress of scientific research. We therefore welcome this opportunity of discussion and are glad to find that our views are not as different from those of Kesel *et al.* as we had thought.

Yours faithfully,

University of Durham
Medical School,
King's College,
Newcastle upon Tyne, 1.

G. NEIL JENKINS.
DONALD E. WRIGHT.

DENTAL DISEASE IN PARTS OF TRINIDAD AND BRITISH GUIANA

SIR,—It is somewhat disturbing to have the integrity of one's experimental observations disputed in the manner of Mr. Dillon's letter of March 20. However, if he can contain his bewilderment until the Annual Meeting of the Association (July 4), I will then attempt to refute his implications. On the same occasion it would be interesting if Mr. Dillon produced the scientific data on which his own beliefs are said to be founded.

Yours faithfully,

King's College Hospital
Medical School,
Denmark Hill, London, S.E.5.

J. D. KING.

SECTIONAL IMPRESSIONS IN ANTERIOR RESTORATIONS

SIR,—I have read with interest articles in the January 2 issue by Mr. H. S. M. Crabb and again in the March 6 issue by Mr. L. J. H. M. Sickling, regarding the device for taking sectional impressions for anterior restorations, whereby a facsimile model of a tooth with any intricate inlay cavity can be made.

Mr. Crabb was courteous enough to say that the addition of a locking screw was made to a " basic type " of device, though he inferred that the device was made at Guy's Hospital Dental School. Mr. Sicking, however, states that the device was invented 10 to 15 years ago by two Dutch members of the profession, E. Flaumenhaft and Coeberg, and ends with the words " good as the idea of Mr. Crabb is," etc. I fear that both Mr. Crabb and Mr. Sickling are unaware of the origin, as I claim to be the inventor, having done the original research work, designed and patented the device 20 years ago ; at that time having made exhaustive enquiries in order to ascertain that such a device had not previously been thought of or designed.

I demonstrated the use of my sectional impression " carrier " before branch meetings of the B.D.A. in 1931, and realising such demonstrations were valueless unless the device could be made available to the profession, I had several gross made. Doubtless it was one of these which found its way into Guy's Dental School, since Mr. Crabb's diagram is identical with the illustration filed with my original patent specification. In consequence I feel both gentlemen will see justification in my informing them that I am the originator.

By pure coincidence, some weeks before Mr. Crabb's

demonstration and article, and as a result of frequent applications from individual dentists and dental houses for the device, I arranged for its manufacture in bulk quantities, and handed over the distribution to one of our leading dental houses, who now have the matter in hand.

To revert to the practical; although I previously found it adequate to fix the reassembled halves with sticky wax, I regard Mr. Crabb's locking screw of added value. He will be interested to know that this is being incorporated. I now find the use of Zelex as the impression medium has been revolutionary, the final models produced with it being the perfection of extreme accuracy —a quality in the model without which no indirect gold inlay technique should be attempted. A thin soap solution is used as the separating medium with Zelex. The method is also pre-eminently useful for models for jacket crowns. Compared with the time and strain involved in carving a direct impression for a porcelain faced gold inlay (in present inferior wax) and the risks of distortion in withdrawing, with resultant "misfit inlay"; the simplified "few minutes technique" using this sectional device and Zelex, yields invaluable conservancy in surgery time and energy. The extreme accuracy of the model ensures a beautifully fitting inlay.

In conclusion, Sir, this letter was not contemplated as an unprofessional act of advertising, but had three motives: firstly, to give a further practical hint on a method which appears to be evoking interest; secondly, to indicate that however personally gratifying demonstrations of a device at meetings are, they are of no further value unless the device can be put at the disposal of the profession for the common good (no easy task nowadays); and finally a plea for justification, that the originator should not remain in complete obscurity.

Yours faithfully,

6, *Chad Road*, R. PORTMAN GRAHAM.
Edgbaston,
Birmingham 15.

ESTIMATION OF COLLAGEN IN HARD TISSUES

SIR,—In connection with the abstract dealing with the estimation of collagen in hard tissues, which appeared in the last issue of the Journal, the following comments may clarify that necessarily short communication.

When samples are incinerated to determine the amount of organic matter as the loss in weight, the inorganic salts are considerably modified; combined water is also lost, since only "moisture" is removed by drying in the oven. For these reasons the usual values of 25–28 per cent "organic matter" are too high. Of the 20 per cent which appears to be present according to the evidence under discussion, 19 per cent can be accounted for as collagen and citric acid. Of the mucopolysaccharide, half is present in the acid solution resulting when collagen is isolated by decalcification, but an equal amount (0·2 per cent) remains firmly attached to the collagen and is probably as characteristic of the protein as is the glucose-galactose component which is discussed in this issue of the Journal. There is therefore good agreement with the figure given by Rogers (1949), since this author measured the total quantity of the amino sugar (0·10 per cent) which accounts for approximately one-quarter of the mucopolysaccharide as isolated by Pincus (1950). In order to avoid enquiry from those who may refer to the letter concerning the concentration and distribution of polysaccharide in bone and dentine (Rogers, 1949), it may be mentioned that during the present investigation it was not possible to demonstrate in significant amounts the "reducing substances" to which this author refers alongside the amino sugar values.

The writer considers that the omission of histological examination on teeth from which dentine samples were obtained is more serious than the abstractor has suggested. Nevertheless, in the full account it will be seen that attention has been paid to the statistical background of the analytical figures reported. The material available had itself been drawn from a relatively unknown and biased population (i.e. those who visit dentists and have sound teeth extracted). The biological variation of individual dentine samples was actually found to be at least 3 per cent, which is far above the error due, for example, to including even the whole of the cementum. Of the samples investigated, a proportion was of a density lower than that ascribed to dentine but, as was expected, this material (2–3 per cent) behaved analytically like dentine containing one-third more organic matrix; the maximum effect on the values quoted would be 1 per cent. To answer a last point, it should be stated that when the dry dentine fragments were freed from pulp tissue before crushing, care was taken not to grind the walls more than to achieve a smooth appearance. Nevertheless, a 0·1 mm. predentine layer might well have been removed by such a process.

Yours faithfully,

Department of Dental Medicine, M. V. STACK.
Guy's Hospital,
*London, S.E.*1.

Reviews and Abstracts

DENTAL SURGERY AND PATHOLOGY by T. W. Widdowson, F.D.S. R.C.S.Eng., and E. V. B. Widdowson, L.D.S. R.C.S.Eng. Fourth Edition. Published by Staples Press Limited, London. 745 pages with 10 colour plates and 403 illustrations. Price 63s.

This is a synopsis which is written for both the busy practitioner and the student. The requirements of these two classes of reader tend to be very different and a book that attempts to satisfy them is in danger of falling between two stools.

Most of the subjects are dealt with in the form of notes which gives to the text a staccato style which the reviewer finds unpleasant, but this may be a personal idiosyncrasy.

In dealing with ætiologies, the authors quote, with little attempt at evaluation, the opinions of many observers. Some of the statements quoted are directly contradictory and many were made years ago when dental pathology was in its infancy. This method of treatment of a subject merely serves to confuse the student and is probably of little value to the practitioner unless accurate references are given for the conflicting statements, which is not the case in this book.

Some of the methods of treatment, such as potassium chlorate internally and liq. arsenicalis-vinum ipecacuanha mixture externally for ulcerative gingivitis,

are obsolete, but this is not indicated. Most authorities would agree that, if the insertion of dressings of paraform and zinc oxide to desensitise cavities in preparations for fillings is to be mentioned, it should only be in order to condemn the practice.

A careful rephrasing of some parts of the text would appear to be necessary. Critical readers will be irritated by such a statement as the following, made in reference to dental caries, " On account of the pathological nature of the disease, it being an acquired character (a mutilation derived during the life of an individual), its direct inheritance, unless one is a Lamarkian, is impossible."

No book passes into four editions without possessing some merit. The chapter dealing with fractures is good and that on orthodontic treatment, which is contributed by Mr. Russell Marsh, is a well balanced and lucid account, admirably suitable for both the student and the practitioner who wishes to refresh and bring up to date his knowledge of this difficult subject.

The book contains 10 well-chosen coloured plates, reproduced from various sources, which are refreshing in their clarity.

KONSERVIERENDE ZAHNHEILKUNDE. 3rd Edition. By Dr. Hans-Hermann Rebel, ord. Professor fuer Zahnheilkunde an der Universitaet Tuebingen. Munich : Carl Hanser Verlag. 1950. Pp. 584. Price 37 D.M.

This book is designed as a standard textbook for undergraduate teaching and should be equally helpful as a work of reference for the busy dental practitioner. It is well illustrated and the quality of paper and printing is excellent.

The book contains a wealth of reliable information on all aspects of operative dentistry, and many matters appear in a new light and are treated with a refreshing independence of mind. One outstanding feature is the thoroughness with which the many problems of root canal and pulp therapy are discussed ; no less than 208 pages are devoted to this important subject.

There are many references and an impressive list of authors, but it would have been helpful if, at least for the more important authors, details had been given of the publications from which they were quoted. As it is this book does not contain a bibliography in the accepted sense.

There is a general tendency towards unnecessary repetition, and some aspects of a subject are dealt with in minute detail, to wit, one full page is given over to the properties and manipulation of steel, and a further six pages to the theory and detailed construction of dental burs, while in other places important techniques are omitted altogether or are dealt with too sketchily. More detail in the description of cavity preparation technique (e.g. Class II Black, p. 177) would help the beginner considerably. The lack of reference to " Hygroscopic Expansion Technique " (Scheu *et al.*) makes it appear as if the, otherwise very complete, chapter on casting investments had not recently been revised. No mention is made of the manufacture of inlay dies by electroforming. Other important laboratory techniques omitted altogether are vacuum investing (Hollenback, *et al.*), and the use of wetting agents.

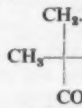
The chapter on porcelain inlays is largely obsolete. The discussion on the composition of amalgams is hardly complete without mention of Marie Gayler's classical researches, an omission which will render the conclusions reached unacceptable to readers in this country.

A tendency to give prominence to proprietary preparations seems a disadvantage shared with many continental textbooks. These criticisms do not detract from the high value of Professor Rebel's book which will constitute a very welcome addition to the library of practitioners and undergraduates alike. It is to be hoped that the publishers will see their way to produce it in an English translation in the not too distant future.

THE 1950 YEAR BOOK OF DENTISTRY. Edited by S. D. Tylman, D.D.S., M.S., D. A. Keys, D.D.S., J. W. Knutson, D.D.S., Dr. P. H., G. R. Moore, D.D.S., M.S., H. B. G. Robinson, D.D.S., C. W. Waldron, M.D., D.D.S. The Year Book Publishers Inc., Chicago. H. K. Lewis & Co., London. Pages 525, 384 illustrations. Price 37s. 6d. net.

The high standard of production of these very useful volumes has been maintained or even improved upon this year. The format has been changed a little, mainly in the use of a slightly larger page which results in a slimmer volume. The important articles published during the previous year are presented in the form of well-constructed abstracts to many of which critical comments by the editors are appended. Most of the papers selected are from American sources but most of the significant ones published in British journals are included and a few from the literature of other European countries. The articles are well classified so that the reader has little difficulty in directing his attention to the subjects in which he is most interested. A large number of the original illustrations are reproduced. This is a book which may be strongly recommended to those who find difficulty in keeping pace with the large volume of periodical literature published every year.

A New Amino-Acid Obtained from Human Urine.—Paper chromatographic analysis of human urine and body fluids using phenol and collidine-lutidine as solvents had frequently indicated the presence of a ninhydrin-reacting substance in the position occupied by methionine sulphoxide. However, it was shown that this was not the sulphoxide. Further investigation of human urine has shown that the substance is $-\beta$-aminoisobutyric acid (α-methyl-β-alanine), a curious molecule not so far reported elsewhere in Nature. The structural formula is



This finding will be of interest to those working on dental tissues, since the use of paper chromatographic analysis to investigate these tissues is likely to increase.—CRUMPLER, H. R., DENT, C. E., HARRIS, H., and WESTALL, R. G. (1951) *Nature, Lond.*, **167**, 307.

The Fluorescence Phenomenon of the Tongue.—When the mouth is viewed under ultra-violet light screened with Wood's glass a reddish-orange fluorescence is often visible on the dorsum of the tongue and sometimes on the teeth. This is known to be due to porphyrins produced by oral micro-organisms. 400 patients in medical

wards or attending a blood clinic and 200 healthy persons were examined for this phenomenon. The majority showed fluorescence of the posterior part of the dorsum of the tongue. With a hand-lens the fluorescence was seen to be composed of small points corresponding with the filiform papillæ. Material scraped from the tongue surface exhibited fluorescence. On the whole the fluorescence was less in the aged and tended to be absent where the filiform papillæ were atrophic. In anæmias and vitamin B deficiencies there was a tendency towards absence of fluorescence which was sometimes restored by doses of iron or vitamin B. Small groups of patients were given antibiotics in lozenge form. Penicillin, streptomycin and chloramphenicol all abolished fluorescence within a few days. Aureomycin could not be tested in this way because this substance itself produces a yellow fluorescence. Sulphathiazole lozenges had no effect.—TOMASZEWSKI, W. (1951) *Brit. med. J.*, **1**, 117.

THE HEALTH SERVICE

SUPERANNUATION AND INCOME TAX

THE method of treating Superannuation contributions for income tax purposes was explained in the *British Dental Journal* of October 7, 1949 (p. 197).

It appears that in some cases Superannuation contributions paid during the year 1948–49 were not allowed by Inspectors of Taxes as a charge on the income for that year but were claimed as reliefs in respect of the tax payable for the year 1949–50. As a result, when the arrangement set out in the Journal was introduced many dentists became entitled to a refund of income tax paid in respect of the year 1948–49 on the amount of their contributions to the Superannuation Scheme during that year.

Members may wish to verify from their Accountants that such reliefs have been claimed on their behalf if they were entitled in this way.

SUPERANNUATION QUERIES

Transfer of Superannuation Rights

Q. *I am a public dental officer and am at present contributing to my local authority's superannuation scheme under the Local Government Superannuation Act* 1937. *If I become a practitioner can I transfer to the Health Service scheme the time I have put in under the local authority scheme?*

A. Yes, provided that :

(1) you become a practitioner within 12 months of leaving your employment as a public dental officer ; *and*

(2) you give notice to the Executive Council within three months of changing over that you wish to bring into the Superannuation Scheme the advantage of your previous service.

Re-entry into the Service

Q. *I am* 40. *I left the Health Service eighteen months ago but came back into it last month. What is my position?*

A. If you leave the Health Service for more than twelve months you lose the benefit of any previous service : i.e. you start afresh on re-entry as if you were entering for the first time. But if you wish to do so, you have the right to make additional payments to cover your time out of the service, and then to count that time as contributing service for the purposes of superannuation. It would be to your advantage to " buy back " your time outside in this way. Your Executive Council will give you particulars of the additional payments necessary.

SPECIALIST HOSPITALS

ON March 8 Sir I. Fraser (*Morecambe*) asked the Minister of Health in how many cases general practitioner, cottage type, hospitals had been converted to specialist hospitals or for other purposes under the National Health Scheme.

The Minister of Health said in reply that according to his present information nine hospitals in which general practitioners formerly provided for their own patients treatment not of a specialist nature had been converted into specialist hospitals or for other uses. Specialist staff had also been introduced into a number of small general hospitals where general practitioners formerly provided special forms of treatment, but in many of these and also in some other hospitals some beds had been reserved for patients under the care of general practitioners.

The Minister was then asked in cases where the local people had been deprived by specialising of their local hospital what alternative arrangements were being made for them.

The Minister replied that nobody had been deprived of a hospital but that in most of these cases the local people were now given the advantage of a specialist service over and above what they had had before.

Dr. Hill (*Luton*) then asked in what portion of the nine cases mentioned had a Regional Hospital Board acted contrary to the advice given by the Minister's predecessor. The Minister replied that he was sure that the advice given had been carefully considered by all the regional hospital boards when making their plans ; and that the boards had made them to the best of their ability in the light of local circumstances and on that advice.

HEALTH SERVICE FEES

THE Minister of Health, in a written answer on March 22, told Sir H. Lucas-Tooth that on the basis of a sample it was estimated that the total cost of the General Dental Service in the financial year 1949–50 might be divided as follows : Examinations, 5 per cent. Extractions, 6 per cent. Dentures, 61 per cent. Conservative work, 28 per cent.

APPOINTMENT

MR. L. B. CORNER, senior dental officer County Antrim, has been appointed Principal Dental Officer to the General Health Services Board for Northern Ireland. Mr. Corner has for some years been secretary of the Northern Ireland Committee of the British Dental Association and of the Northern Ireland Division of the Public Dental Officers' Group.

BUDGET ANTICIPATION

THE *Evening Times*, Glasgow, reports that dentists in some districts in the city are being inundated with patients as a result of speculation about cuts in the health service. A dental surgeon is reported as having said " There is an increasing number of patients who want their own teeth drawn—although there may be no urgent necessity for this. They seem to think that as they have to lose their own teeth sometime they might as well do so voluntarily while the free teeth are available." This almost defies comment other than that it is itself a striking commentary on the dental education of a section of population.

SALARIES OF PUBLIC DENTAL OFFICERS

Whitley Council Agreement

THE Dental Whitley Council (Local Authorities) have now issued their recommendations regarding the remuneration and general conditions of service of dental officers employed full-time in the service of local authorities.

In a preamble to their recommendations the Council say they have had regard to the fact that dental officers, as compared with assistant medical officers in the local authority service, have not the like prospect of proceeding to a higher post, and they therefore sought to provide a career grade. On this account, the salary fixed for the basic grade of dental officer, whilst commencing at a figure lower than that of the assistant medical officer, proceeds to a maximum £100 higher.

Following the precedent adopted by the Industrial Court in the recent arbitration on the salaries of medical officers employed by local authorities, each dental officer is to be placed on the point in the new scale which he would have reached had the scale been operative at the date of his appointment to his present post. This is in accordance with what is known as the " corresponding points " principle.

The salary scales and conditions of service are set out in the following Schedules.

FIRST SCHEDULE

SALARY SCALES

(1) *Dental Officers*

£800 per annum rising by annual increments of £50 to a maximum of £1,250 per annum, the employing authority having discretion to allow one increment for each year of experience in practice up to a maximum of five years.

(2) *Chief Dental Officer*

Population not exceeding	*Salary Scales*
100,000	£1,250 rising by one increment of £50 to a maximum of £1,300.
150,000	£1,250 rising by annual increments of £50 to a maximum of £1,350.
250,000	£1,250 rising by annual increments of £50 to a maximum of £1,400.
400,000	£1,250 rising by annual increments of £50 to a maximum of £1,450.
600,000	£1,250 rising by annual increments of £50 to a maximum of £1,550.
Over 600,000	At discretion.

(3) *Other Dental Officers*

The salaries of dental officers employed by local authorities in posts other than those referred to above are left to the discretion of local authorities, it being understood that the salaries of such officers shall be fixed in relation to those prescribed in (1) and (2) above.

Interpretation

(*a*) The discretionary powers of employing authorities in respect of the salary scale for dental officers may be exercised in the case of officers in post as well as on appointment.

In the case of officers in post the discretion should be exercised before assimilation on the " corresponding points " principle.

(*b*) *Population figures* (*Chief Dental Officer*)

Population figures for the purpose of applying the agreed scales shall be the population figures shown in the Returns of the Registrar-General published next before 1st April and shall be operative for the purpose of increase or reduction in salary as from the 1st April next following the publication of such Returns. Population is to be taken to mean, in the case of county councils in England and Wales, the population of the administrative county, and in the case of county councils in Scotland the population of the areas for which the county dental officer is directly responsible.

(*c*) *Chief Dental Officer*

For the purposes of these recommendations the expression " chief dental officer " includes the chief or senior or principal dental officer employed by a local authority and the Council have assumed that a local authority will make only one such appointment.

SECOND SCHEDULE

CONDITIONS OF SERVICE—CHIEF AND OTHER DENTAL OFFICERS

1. *Whole-time Service*

An officer employed by a local authority shall devote his whole time service to the work of the authority, and shall not engage in any other business or take up any other additional appointment without the express consent of the authority.

2. *Inclusive Salaries*

The salaries set out in the First Schedule shall be inclusive.

3. *Transferred Officers*

Where an officer transfers from one local authority to an appointment in the same grade with another local authority, service with the former authority in that grade may in the discretion of the new authority be credited in fixing the appropriate commencing salary.

4. *Annual leave*

Officers shall be entitled to a minimum of four weeks' annual leave exclusive of public holidays.

5. *Removal expenses*

Where an officer is required by a local authority to transfer to a district under the jurisdiction of the same authority, the cost of removal shall be reimbursed provided that an estimate of cost has first been approved by the authority and that removal expenses are to include only such expenses as are reasonably incurred in connection with the removal, namely, those directly arising out of the transference of furniture and household goods.

6. *Termination of appointment on marriage*

Where termination of appointment on marriage is a condition of the appointment a statement to this effect shall appear in the advertisement and in any contract of service.

7. *Right to publish books or articles*

An officer shall not, by virtue of his appointment, be precluded from publishing any book or article of which he is the author, provided that he does not without the consent of the authority describe himself as holding an appointment with a local authority.

8. *Travelling and subsistence allowance, sickness payments and miscellaneous provisions*

Conditions of service relating to leave of absence for service in auxiliary services, sickness payments, maternity leave for women officers, travelling, subsistence and motor car allowances and other general conditions shall

not be less favourable than those generally applicable to other officers in the service of the local authority, except that in Scotland officers shall be conditioned to the sick pay scheme in operation in Scotland for other local authority officers.

THIRD SCHEDULE

Operative Dates for First and Second Schedules

1. The First Schedule shall operate from and including the 1st October, 1950, in the following manner :—

(i) Each local authority shall fix the salary scale applicable to each officer, applying the principles set out in paragraph 3 of the Preamble (i.e. the " corresponding points " principle) and in the First Schedule and shall fix the point of entry accordingly. In so fixing the point of entry the authority may, in their discretion, act in accordance with the paragraph (*a*) under the heading *Interpretation* in the First Schedule.

(ii) Where a local authority are at present paying the officer a salary less than the salary at the point of entry fixed by the local authority under sub-paragraph (i) the authority shall, with effect from the 1st October, 1950, pay to the officer a salary which is halfway between his present salary and such point of entry and shall, with effect from the 1st October, 1951, pay to the officer a salary commencing at the said point of entry. Provided that if an authority wish to defer the payment of the increase which becomes effective on the 1st October, 1950, until the financial year 1951–52 they may, at their discretion, add the amount of the increase due from the 1st October, 1950, to the 31st March, 1951, to the salary payable from the 1st April, 1951.

(iii) Any annual increments payable in accordance with the scale applicable shall first commence to be paid on the 1st April, 1952, and shall be paid thereafter on the 1st April in each year.

For example :—

(1) *A dental officer with* 10 *years' experience in practice, including* 7 *years' service with his present local authority, would, if in receipt of a salary of* £1,000 *per annum on* 30*th September,* 1950, *be eligible under these recommendations to be treated in one of the following ways* :

(a) *if the local authority decide to exercise their discretion in the matter of increments for years of experience—he will receive a salary at the rate of* £1,125 *per annum from* 1*st October,* 1950 *and at the rate of* £1,250 *per annum from* 1*st October,* 1951.

If the local authority decide not to exercise their discretion he will receive a salary at the rate of £1,075 *per annum from* 1*st October,* 1950, *and at the rate of* £1,150 *per annum from* 1*st October,* 1951 ;

or

(b) *if the local authority decide to exercise their discretion both in the matter of increments and in the method of payment referred to in* (ii) *above—*

he will receive a salary at the rate of £1,250 *per annum on the* 1*st April,* 1951.

If the local authority decide not to exercise their discretion in the matter of increments but only in the method of payment—he will receive a salary at the rate of £1,150 *per annum from* 1*st April,* 1951.

(c) *if the local authority have not taken outside experience into account in fixing the salary, increments of* £50 *will become payable on* 1*st April,* 1952, *and* 1*st April,* 1953.

(2) *A dental officer with* 5 *years' experience in practice including* 2 *years' local authority service would, if in receipt of a salary of* £850 *per annum on* 30*th September,* 1950, *be eligible to be treated in one of the following ways—*

(a) *if the authority decide to exercise their discretion in the matter of increments for years of experience—*

he will receive a salary of £950 *per annum from* 1*st October* 1950, *and at the rate of* £1,050 *per annum from* 1*st October* 1951 ;

if the local authority decide not to use this discretion—

he will receive a salary at the rate of £875 *per annum from* 1*st October,* 1950, *and at the rate of* £900 *per annum from* 1*st October,* 1951 ;

or

(b) *if the local authority decide to exercise their discretion both in the matter of increments and the method of payment—*

he will receive a salary at the rate of £1,050 *per annum from* 1*st April,* 1951 ;

if the local authority decide to exercise their discretion in the method of payment only—

he will receive a salary at the rate of £900 *per annum from* 1*st April,* 1951.

(c) *In either case* (a) *or* (b), *the first increment due will fall to be paid at* 1*st April,* 1952.

(3) *A chief dental officer serving a local authority with a population of* 250,000, *with twelve years' experience in practice, including two years with a local authority, who is due to receive a salary at the rate of* £1,350 *per annum and who on the* 30*th September,* 1950, *receives a salary of* £1,200 *per annum, shall be paid without regard to any increase in the salary of* £1,200 *per annum which may be due to him—*

(a) *at the rate of* £1,275 *per annum from* 1*st October,* 1950, *and at the rate of* £1,350 *per annum from* 1*st October* 1951 ;

or

(b) *if the authority exercise the discretion referred to in* (ii) *above a salary at the rate of* £1,350 *per annum from* 1*st April,* 1951 ;

(c) *in either case an increment of* £50 *will be payable on the* 1*st April,* 1952.

It will be noted that the discretion to count experience other than local authority experience does not apply in the case of chief dental officers.

(iv) If, after the commencing salary has been determined, no immediate increase in salary is payable to the officer, but increments fall to be paid in accordance with the first Schedule, then the first increment shall be paid on the 1st April, 1952, and subsequent increments on the anniversary of that day.

(v) If an officer was on 1st April, 1949, within five years of pensionable age, or if he reaches an age within five years of pensionable age on any day thereafter not later than 1st October, 1951, the First Schedule shall operate in his case as from 1st April, 1949, or the day when he reaches an age within five years of pensionable age, whichever is the later, so that he shall receive as from that day a salary ascertained in accordance with paragraph (i) above with increments in accordance with the First Schedule on the first and subsequent anniversaries of that day provided that the foregoing recommendation shall not operate in any case to which recommendation (vi) immediately following may apply without the undertaking therein referred to being previously given.

(vi) Where an officer would be able, under the appropriate Local Government Superannuation Act governing his case, to retire before reaching the age of compulsory retirement, he shall, in asking for the recommendations to be applied to him on the ground that he is within five years of pensionable age, undertake to retire at the expiration of five years from the day of the application of the provisions to him, in which case the provisions of paragraph (v) shall apply.

(vii) For the purpose of paragraphs (v) and (vi) the

expression " pensionable age " means the earliest date at which an officer is enabled to retire under the provisions of the Superannuation Act appropriate to his case.

2. The conditions of service set out in the Second Schedule shall operate as from the 1st April, 1951.

FOURTH SCHEDULE

1. " *No detriment* " *Clause*

The operation of the scales recommended shall not in any circumstances result in reducing the salary of any officer in post.

An officer in post may opt to retain his old salary scale together with all his old conditions of service. He cannot, however, retain one or more of his old conditions if he opts for the new scale neither can he take one or more of the new conditions if he retains his old scale of salary.

2. *Appeals*

The appeals machinery detailed in the relevant documents sent to the local authorities under cover of circular letters G.C.(L.A.) 11 and 11A, dated the 9th August and 25th September, 1950, respectively, and also issued to the staff side of the Council, shall apply.

DENTAL NEWS

ROYAL COLLEGE OF SURGEONS OF EDINBURGH

AT a Ceremony held in the Royal College of Surgeons at Edinburgh on March 14, 1951, Mr. W. Quarry Wood, President, in the Chair, the following were admitted Fellows in Dental Surgery without Examination: Mr. J. Aitchison, Professor A. B. P. Amies, *C.M.G.*, Mr. A. J. Arnott, Dr. W. Balendra, Air-Commodore G. A. Ballantyne, *C.B.E., D.F.C., K.H.D.S.*, Professor J. Boyes, Messrs. A. J. Brown, T. R. Calder, J. R. J. Cameron, Dr. E. Charron, Messrs. H. M. Crombie, A. Cubie, J. W. Daunt, Dr. V. Desai, Messrs. T. H. J. Douglas, R. C. Scott Dow, Professor Ernest Sheldon Friel, Mr. F. G. Gibbs, Professor A. D. Hitchin, Messrs. A. P. Husband, A. C. W. Hutchinson, J. D. H. Jamieson, C. H. Kemball, Dr. E. Lapira, Mr. W. R. Logan, *O.B.E.*, Dr. S. F. Lumb, Messrs. J. Lyons, K. McGrath, A. Macgregor, *O.B.E.*, D. MacGregor, A. G. Mackay, W. F. Mackenzie, D. S. Middleton, A. E. Miller, C. F. Mummery, T. Rankin, *O.B.E.*, C. Read, D. L. Rogers, A. E. Rowlett, Professor M. A. Rushton, Messrs. H. R. Shah, H. M. Sturrock, W. R. Tattersall, Professor E. K. Tratman, *O.B.E.*, Messrs. J. P. Walsh, J. F. Webster, Surgeon Captain (D) F. R. P. Williams, *C.B.E.*, Surgeon Captain (D) J. T. Wood, *C.B.E.*

ROYAL ACADEMY OF MEDICINE, IRELAND

AT the invitation of the Royal Academy of Medicine in Ireland an Odontological Section of the Academy was formed last October, the opportunity for closer working with their medical colleagues being welcomed by the dental profession. Mr. George Yeates, B.Dent.Sc., was elected President of the Section and Mr. Adrian Cowan, *M.B.*, F.D.S. R.C.S.Eng., Secretary. A very successful first session was brought to a close at the March meeting.

DURHAM COUNTY COUNCIL—TRADE UNION MEMBERSHIP

A DEBATE on this subject took place on the adjournment in the House of Commons on March 9, 1951, when Miss Horsburgh (*Manchester, Moss Side*) moved a resolution regretting the decision of the Durham County Council in insisting on membership of an appropriate professional association or trade union as a condition of employment by the Council. In the course of debate the Minister of Education, Mr. Tomlinson, supported an amendment which expressed the hope of the Government that discussions proceeding between the County Council and some of the associations concerned would lead to an amicable settlement of some of the points at issue. The Minister stressed that conversations were proceeding between the National Union of Teachers and the County Council and that he was particularly anxious that the problem should be solved in this way rather than by the intervention of the Government.

The House divided and as a result the amendment to the motion was carried by 298 votes to 283.

PAY OF TECHNICIANS IN NORTHERN IRELAND

AN Agreement has been made between the British Dental Association (Northern Ireland), the North of Ireland Dental Laboratory Owners' Association and the Northern Ireland Dental Technicians' Branch of the Union of Shop, Distributive and Allied Workers that a weekly bonus shall operate in respect of dental technicians and apprentices as from the first pay day in March, 1951, as follows:—

The revised minimum weekly rates are:—Apprentice dental technicians—1st year 23s., 2nd year 31s., 3rd year 40s. 6d., 4th year 58s., 5th year 69s.

After the completion of five years' apprenticeship, technicians are to be paid at the minimum rate of £5 15s. per week for one year after which the minimum weekly rate shall be £7 10s.

SCHOOL SERVICE

THE Minister of Education, in a written answer on March 15, said there were five school dental officers, all full time, in the employment of the Norfolk County Council.

MR. HARDMAN, Parliamentary Secretary to the Board of Education, in reply to a Question on March 22, said there was no school dentist in the Rother Valley area but emergency treatment was available at Rawmarsh. Asked by Mr. David Griffiths whether he was aware that there were over 12,000 school children in the area, and that for a considerable time there had been no dentist at all, Mr. Hardman said in the past the area had been served by a visiting dentist. He did not suggest that was adequate and agreed that something must be done about the matter.

The Cardiff Dental Post-Graduate Committee announce that the course to be given by Dr. G. G. Exner will be held on May 26 and 27 instead of on May 19 and 20 as previously announced.

The Schools

The University of Bristol Dental School.—The Annual Clinical Meeting was held on Saturday, March 10, and was well attended. The number of demonstrations, covering a wide range of subjects, exceeded that of previous years and the newly equipped Museum, now nearing completion, was open for the first time. The item in which the greatest interest was shown was S. S. White's film " Air-brasive Technique."

After the Clinical Meeting there was a meeting of past and present students. At this it was decided that the Clinical Meeting and Reunion Dinner should, unless any exceptional circumstances arose, in future be held on the second Saturday in March.

In the evening the Annual Reunion Dinner was held at the Hawthorns Hotel. Mr. S. K. Rigg was in the Chair and the Guest of Honour was Professor E. K. Tratman, himself a past student of Bristol University. As at the Clinical Meeting, the rapid development at the School was emphasised by the fact that the number present at the Dinner was again a record.

Guy's Annual Dinner.—Some 360 people were present at the Dinner of the Guy's Hospital Dental Society which was held at the Park Lane Hotel on Saturday, March 3. Mr. Farrer-Brown, Secretary of the Nuffield Foundation and a member of the University Grants Committee, proposed the toast of the Hospital and School, to which Sir William Kelsey Fry replied. Professor Rushton proposed the toast of the guests who included Lord Cunliffe, Chairman of the Board of Governors of Guy's; Professor Lillian Penson, Vice Chancellor of the University of London; Professor Wilkinson; Dr. Fish; Mr. Farrer-Brown; Dr. Senior; the Directors of the Dental Branches of the Royal Navy and Royal Air Force; the Deans and Sub-Deans and the student representatives of other schools.

Replying to the Toast Professor Penson spoke of the great interest which the University continues to take in all matters appertaining to dental education.

Dr. Marston, proposing the toast of the President, Mr. Arthur Bulleid, reminded those present of the distinguished career of their President. Mr. Bulleid, who was greeted with prolonged applause, expressed his thanks for the great reception they had given him. It was a matter of great delight that he was accompanied by Mrs. Bulleid, who made a gracious hostess.

Queens University, Belfast.—The Senate of the University is to apply to the Government of Northern Ireland for permission to start building in 1952 a block to accommodate the departments of botany, zoology and pre-clinical dentistry. It is announced that the City of Belfast has increased the annual grant to the University by 30 per cent to a total of £7,500.

NUMBER OF DENTAL STUDENTS

SIR H. LUCAS-TOOTH asked the Minister of Health, March 15, what was the annual intake of dental schools in the years 1946, 1947, 1948, 1949 and 1950 respectively. Mr. Marquand said the figures were 641, 654, 662, 611 and 606 respectively. Asked how long he thought it would be before there was an adequate number of dentists in the country, Mr. Marquand said the recent decrease was explained by the fact that during the war there was a lowered intake and, therefore, in the first few years after the war it was possible to increase the entry. It was now necessary to get a balance, and the number had been slightly reduced. He agreed that the total intake was not satisfactory in the country as a whole.

The Services

NEW DIRECTOR ARMY DENTAL SERVICE

Major-General J. Wren, F.D.S. R.C.S., has been appointed Director, Army Dental Service, in succession to the late Major-General H. J. Higgins, *C.B.*, *O.B.E.*, F.D.S. R.C.S.

Major-General Wren was born in 1896 in Cork and qualified at the National University of Ireland in 1918. He took a commission as a dental surgeon in the Army in the same year. During the last War he held administrative appointments both at home and overseas and immediately prior to his present appointment was Deputy Director of Dental Service, Eastern Command.

The Charge for Announcements of Births, Marriages and Deaths is 2s. 6d. per Line. (Approximately 8 words.) Minimum 7s. 6d.

Birth

FORREST.—On March 12, at the Yarborough Nursing Home, Southsea, to Mary, wife of Surgeon Commander (D) W. I. N. Forrest, R.N., a son.

Marriage

BEAVER—IRVINE.—On March 11, 1951, at St. Michael's and All Angels' Church, Mill Hill, Alfred Edwin Beaver, to Elizabeth Irvine, B.Ch.D.Leeds.

Our Diary

Thursday, April 5.

Northern Counties Branch.—Sutherland Dental School, Newcastle-on-Tyne, 7 p.m., preceded by Council meeting, 6 p.m. "Some Principles in Oral Surgery," B. W. Fickling.

Birmingham Medical Institute—Odontological Section.—154, Gt. Charles Street, Birmingham, 6.30 p.m. "Tungsten Carbide and Its Application to Drilling in Dentistry," G. A. Lammie; "Use of Tungsten Carbide Burs in Practice," R. Draycott. Annual Business Meeting will follow.

Metropolitan Branch—Hampstead Sub-Section.—Hampstead General Hospital, 8.30 p.m. Film: "Airbrasive Technique," a non-mechanical means of cutting tooth structure and scaling teeth. Visitors welcomed.

Friday, April 6.

Metropolitan Branch—South Eastern Section.—Annual General Meeting, Yorkshire Grey, Eltham Hill. Luncheon 12.45 for 1 p.m. Members attending please inform D. J. Wigginton. ELTham 1706.

Monday, April 9.

The British Society of Periodontology.—Institute of Dental Surgery, Eastman Dental Hospital, Gray's Inn Road, London, W.C.1, 2.30 p.m. Open Clinical Meeting; Annual Meeting; Annual Dinner.

Tuesday, April 10.

Coventry and District Section.—Abbey Hotel, Kenilworth, 8 p.m., preceded by dinner, 7 p.m. "The Treatment of Fractured Incisors in Children," J. L. Hardwick.

Thursday, April 12.

Brighton and District Section.—Annual Meeting, "The Dudley Hotel," Lansdowne Place, Hove, 8 p.m. Casual Communications.

Guildford and District Section.—Annual Meeting, Cotteridge Hotel, Woking, 5.15 p.m., preceded by Clinical meeting, 3 p.m. Annual Dinner, 7 for 7.30 p.m.

University College Hospital Dental Society.—U.C.H. Medical School, 7.30 p.m. "Racial Factors in Dental Disease," Professor E. K. Tratman.

Thursday, April 19.

Central Counties Branch.—Royal Salop Infirmary, Shrewsbury, 7.30 p.m. "Ulcerations of the Mouth," Brian Hales.

Metropolitan Branch.—13, Hill Street, Berkeley Square, London, W.1, 7.30 p.m. "Clinical Conditions of the Mouth," Professor E. K. Tratman.

Bournemouth and District Section.—Annual Meeting, Grand Hotel, Fir Vale Road, Bournemouth, 8 p.m., preceded by an Informal Dinner, 6.30 for 7 p.m. "Applications of Dentistry to Veterinary Practice," J. Birrell.

Monday, April 23.

The Royal Society of Medicine—Section of Odontology.—1, Wimpole Street, London, W.1, 5.30 p.m. "Periodontal Disease and its Treatment," W. G. Cross.

Tuesday, April 24.

Metropolitan Branch—Hampstead Sub-Section.—Hampstead General Hospital, 8.30 p.m. "Cases in which the G. P. and Dental Practitioner can assist each other in Diagnosis and Treatment," John Eldridge. Visitors welcomed.

Friday, April 27.

Oxford Section.—Annual Dinner, Weston Manor Hotel, Weston-on-the-Green, Oxon., 6.30 for 7 p.m.

Saturday, May 5.

British Dental Association Hospitals Group—South-West Metropolitan Division.—Clinical Meeting, Dental Department, Westminster Hospital, Horseferry Road, London, S.W.1, 2.30 p.m.

Monday, May 7.

The British Society for the Study of Orthodontics.—Manson House, 26, Portland Place, London, W.1, 7.30 p.m. Demonstration Meeting.

BRITISH DENTAL JOURNAL

Communications with regard to editorial business should be addressed to THE EDITOR, *BRITISH DENTAL JOURNAL*, 13, Hill Street, Berkeley Square, London, W.1. Telephone: Grosvenor 2761. Telegrams: "Bridention," Audley, London.

Original Articles and Letters submitted for publication are presumed to be offered to the *British Dental Journal* only unless the contrary is stated.

ADVERTISEMENTS should be addressed to the Advertisement Manager, 13, Hill Street, Berkeley Square, London, W.1. Telephone: Grosvenor 2761.

BRITISH DENTAL JOURNAL SUPPLEMENT

April 3, 1951

ASSOCIATION NOTICES

BRITISH DENTAL ASSOCIATION

13, Hill Street, Berkeley Square, London, W.1.
Telegrams: "Bridention," Audley, London.
Telephone Nos.: Grosvenor 1592, 1593.
***Journal Office:* Grosvenor 2761.**

XI INTERNATIONAL DENTAL CONGRESS
GROsvenor 3030

Dentists' Provident Society and Dentists' Insurance Committee. Telephone No.: Grosvenor 1172.

ANNUAL MEETING, LONDON

July 2–6, 1951

President-Elect: MR. E. B. DOWSETT.

Questionnaire

Annual Meeting Questionnaires are being posted to every member of the Association during the first ten days of April. Members will find that they are issued with two separate questionnaires, one relating to the meetings and the Annual Dinner, and the other to the various tours. They are asked particularly to be careful that the questionnaire relating to tours is returned direct with appropriate remittances to Messrs. Thomas Cook & Son Ltd., and the other questionnaire to Headquarters. The questionnaire relating to tours is printed in red and appropriately addressed reply envelopes are being sent to all members.

Members will greatly assist the organisers of the Annual Meeting by returning their completed questionnaires as soon as possible.

Scientific Programme

The Scientific Programme this year will be extensive and varied. Demonstrations will be given and scientific films will be shown on Wednesday, July 4, and Thursday, July 5, and in addition a number of the London dental schools and hospitals will be "At Home" to members during the meeting and it is hoped also that it may be possible to arrange demonstration operative sessions at some of the hospitals.

During the meeting the following papers will be presented:

Symposium: "The Prevention of Dental Disease" (Professor J. Boyes, Dr. J. D. King, Mr. J. Miller).

Dr. C. Keith Simpson "Dental Evidence in the Reconstruction of Crime."

Professor E. K. Tratman "The Classification of Odontomes."

Mr. E. Gwynne-Evans "The Organisation of the Oro-facial muscles in relation to breathing and feeding."

Further details will be published in the Journal as the arrangements are completed.

P.D.O. GROUP PROGRAMME

Monday, July 2

Morning: Golf—Pilbeam Cup.
2 p.m. P.D.O. Group Committee.

Tuesday, July 3

Morning: Visits to Clinics.
2 p.m. Ordinary Meeting of P.D.O. Group. *Symposium* on "Dental Hygiene."
Speakers: P. G. Capon, G. J. Parfitt, J. V. Bingay.
Discussion to be opened by Miss A. S. Stewart.

Wednesday, July 4

Morning: Association Scientific Meeting on "The Prevention of Dental Disease."
1 p.m. P.D.O. Group Luncheon.
Afternoon: Visits to Clinics.

Thursday, July 5

Morning & Afternoon: Visits to Clinics.
5 p.m. Ordinary Meeting of P.D.O. Group.
Paper: "Parodontal Disease in Expectant and Nursing Mothers," by W. G. Cross, Head of the Department of Periodontology, Eastman Dental Hospital.

GOLF PROGRAMME

MONDAY, JULY 2, 1951, AT MOOR PARK GOLF CLUB, RICKMANSWORTH, HERTS.

9.00 a.m. The Irish Challenge Cup (Bogey Competition). Entry fee 2s. 6d.; Optional sweepstake 2s. 6d.

9.00 a.m. The Pilbeam Cup for P.D.O. Group members will be played concurrently with the Irish Cup Competition, the same card counting in both competitions.

9.00 a.m. The Amalgamation Cup for past or present officials and branch officials of any of three dental organisations will be played concurrently with the Irish Cup Competition, the same card counting in both competitions.

2.00 p.m. The London Cup, Inter-Branch Competition (Medal Play) in which all members are eligible to compete.

2.00 p.m. The Scottish Cup (Medal Play). Entry fee 2s. 6d. Optional sweepstake 2s. 6d. This will be played concurrently with the London Cup, the Cup being presented to the player with the best score in the London Cup Competition.

LADIES' COMPETITION AT THE ROYAL MID-SURREY GOLF CLUB, RICHMOND. MONDAY, JULY 2, 1951

10.00 a.m. The Liverpool Cup for lady members and members' wives and daughters. Competition—Medal Play. Entry fee 2s. 6d.

HOSPITALS GROUP

THE South-West Metropolitan Division of the Hospitals Group has arranged a Clinical Meeting to be held in the Dental Department of the Westminster Hospital on Saturday, May 5. The meeting is open to all members of the Association holding hospital appointments whether they are enrolled as members of the Hospitals Group or not. The Secretary of the Division, Mr. D. Munns, 7, Belmont Close, Cockfosters, Barnet, Herts, will be glad to receive offers of demonstrations of clinical cases, if possible by April 7. Full particulars regarding the meeting can be obtained on application to Mr. Munns.

The Library and Museum Committee desire to thank Mr. P. J. Proud for his gift of old dental instruments and a portrait of John Hunter, Mr. E. T. Haworth for diatoric teeth and a cine film, Mr. H. W. Norman for old books, Mr. C. Dillon and Mr. A. Cowes for reprints and Mrs. Thorne for journals.

LIBRARY

Recent Additions

Bacteriology

Strålfors, A.: Investigations into the Bacterial Chemistry of Dental Plaques (*Odont. Tidskr.*, 1950, **58**, 155–341).

Dentistry, General Works

Port, G., and Euler, H.: Lehrbuch der Zahnheilkunde, 6th edition, 1951.

Dentistry, Operative

Coolidge, E. D.: Endodontia, 1950.

Histology

Marsland, E. A.: A Histological Investigation of Amelogenesis in Rats, with special reference to Maturation (Thesis), 1951.

Hypnotism

Stolzenberg, J.: Psychosomatics and Suggestion Therapy in Dentistry, 1951.

Medicine, General

Moench, L. G.: Headache, 1947.

Oral Surgery

Blair, V. P., Ivy, R. H., and Brown, J. B.: Essentials of Oral Surgery, 4th edition, 1951.

Pathology, Dental and Oral

Sarnat, B. G., and Schour, I.: Oral and Facial Cancer, 1950.

Sonesson, A.: Odontogenic Cysts and Cystic Tumours of the Jaws, 1950.

Spitzer, R., and Mann, I. C.: Congenital Malformations in the Teeth and Eyes in Mental Defectives (*J. ment. Sci.*, 1950, **96**, 681–709).

Periodontology

Miller, S. C.: Textbook of Periodontia, 3rd edition, 1950.

Pharmacology and Therapeutics

A.D.A.: Accepted Dental Remedies, 16th edition, 1951.

Prosthetic Dentistry

U.S. Naval Dental School: Handbook for Dental Prosthetic Technicians, 1948.

Branches and Sections

East Lancashire and East Cheshire Branch.—The sixth meeting of the session was held on March 7, at 7.30 p.m., in the Midland Hotel, Manchester.

The Vice-President, Mr. A. H. Williams, was in the chair, and fifty-three members and three guests were present.

Mr. J. Miller, Lecturer in Children's Dentistry and Preventive Dentistry at Manchester University read a paper on "Preventive Dentistry." In this he gave a résumé of the experimental work being carried out in Manchester and elucidated many points raised by members.

Questions were asked by Messrs. Kershaw, Keighly, Taylor, Heilbron, Meek, Doran, Hewitt and Prophet.

A vote of thanks to the speaker, proposed by Mr. A. G. Batten, was received with applause.

Public Dental Officers' Group

THE NEW SALARIES SCALE

AT a meeting of the Public Dental Officers' Group held at Cheltenham on March 10, Mr. D. E. Mason, Chairman of the Group and of the Staff side of the Dental Whitley Council (Local Authorities) presented a report on the agreement, which had been reached by the Council. In the course of this Mr. Mason said that the agreed scales were a compromise between those originally asked for by the staff side and those originally offered by the management side.

It might be asked why the staff side agreed to scales lower than those put forward in the original claim.

The answer to that question was provided by a consideration of what probably would have happened, if the staff side had continued to refuse the offer made to them.

It had to be borne in mind that each individual dental officer held his appointment by virtue of an employment contract between himself and his employing local authority.

Neither the Ministry of Health nor the Ministry of Education could be regarded in any way as being the employers of local authority dental officers. These two Ministries merely hold "watching briefs" in respect of the financial grants which they respectively make to local authorities in respect of approved dental services.

During the negotiations, it had been obvious that although the two Ministries were most anxious that a settlement should be reached, they took the view that the problem must be tackled and settled by selected representatives of employers and employees "getting together" and reaching agreement or alternatively by the two sides putting the insoluble difficulties to arbitration.

The staff side therefore had found themselves confronted by a difficult position. The management side being unwilling to accede to the claims made by the staff side, and the latter unwilling to accept the counter-proposals put forward by the management side, there were three possible alternatives, viz.:

(*a*) to declare the Dental Whitley Council ended and walk out;
(*b*) to resort to arbitration;
(*c*) to secure the best compromise solution by negotiation plus a give and take policy.

To have walked out would merely have perpetuated the existing anomalies in regard to salaries and conditions of service. Those dental officers who maintain that the adoption of the "walking out" policy would have forced "the Ministry to take us over" surely overlook the important point that even a Ministry can only act in accordance with Parliamentary legislation. The staff side were advised that the necessary legislation to enable a "take-over" to take place would take two years assuming the procedure were approved. In the meantime, local authority dental officers would have to continue to work under their respective conditions.

In regard to (*b*), the staff side gave lengthy and serious consideration to the pros and cons of arbitration and also to the implications likely to arise therefrom. The award made by the Industrial Court in respect of arbitration for medical officers was studied in minute detail. The British Medical Association had engaged a K.C. to present their case to the Court and had spared neither expense nor effort, and yet a very unsatisfactory award was made in respect of assistant medical officers. It was of course impossible to forecast what decision would be given by an Arbitration Court in respect of any particular matter referred to it. The staff side, however, sought information from every possible source as to what the Court's decision might be if dental salaries were put to arbitration and as a result they unanimously decided that, under existing conditions, arbitration was dangerous and should be avoided. There was also the further point that arbitration would inevitably have caused a further delay of at least three months which would have carried them beyond "Budget Date," which was a date which might have particular significance this year.

They were therefore left with the policy of accepting the best possible terms they could secure by negotiation, provided they were satisfied that they were better than

those they would be likely to secure through any other agency.

In the subsequent negotiations a position was reached when it became obvious to the staff side that to make further demands would precipitate "policy (*a*)" referred to earlier but with the management side "walking out." And so they settled the issue as it then stood.

Both sides were agreed that the negotiated salary scales will not—under existing conditions of N.H.S. Dental Service—attract additional recruits to the L.A. Dental Service, but these new scales might stop the present drift from the L.A. Dental Service.

The advantages of the agreement could be summed up as follows:—

(*a*) The new scales would mean, on average, an increase in the maximum salary of assistant dental officers of approximately £300, and a somewhat similar increase in the maximum salary of the average senior dental officer.

(*b*) The implementation of the agreement would immediately remove the many ridiculous salary anomalies within the School Dental Service.

(*c*) The agreement (although disappointing in what it has actually secured) had been arrived at in the constitutional way advocated and recognised by the Government. If therefore it failed to "deliver the goods" (and under a continuation of existing conditions of N.H.S. Dental Service it must inevitably fail), then they would be in possession of undeniable evidence to put before ministers that the existing method of providing dental treatment through the agency of local authorities was unworkable and that a change of agency was essential.

The salary scales for senior dental officers of the smaller local authorities were likely to prove very disappointing. Taking the country as a whole, the average number of dental officers at present employed by each individual local authority was approximately four. This average, however, included the big local authorities such as London, Middlesex, etc. If these larger local authorities, with their comparatively large dental staffs, were removed they were left with a big number of smaller local authorities with an average of only 1·4 dental officers (including the senior dental officer) for each authority. The management side of the Dental Whitley Council contended that under existing staffing conditions, the duties of the senior dental officers to these smaller authorities were not very much greater than the duties of assistant dental officers—hence the salary scales in question.

In a note accompanying the above memorandum Mr. Mason adds that the Staff Side had been very much indebted to their secretary, Mr. A. H. Condry, for the whole-hearted manner in which he devoted himself to the work of the Council and the thorough way in which he dealt with every matter he undertook.

P.D.O. Group Notes

"THE old order changeth . . ." Donald Hall has given up the Group Editorship after several years of meritorious service. Maybe not everyone agreed with all he wrote but he is of independent spirit and thought deeply before writing his notes which were usually based on strong convictions. He has made everyone think during a time when thoughtlessness has been rife. Hall remains to represent his colleagues on the Representative Board so his strength will not be lost to the Group.

The Whitley agreement is now public and the profession will have realised that the award of the Industrial Court on the salaries of medical officers set a pattern into which those of dental officers were inevitably woven.

The P.D.O. programme for the Association meeting in July was published in the last issue of the Supplement. P.D.Os., and their local authorities, want events of practical value and interest and this has been borne in mind in making up the programme. Accommodation will be a difficult matter in London in July and London and Home Counties P.D.Os. are asked to try and accommodate colleagues from the provinces. Visitors will bear in mind existing domestic difficulties such as catering, laundry, etc. Will all P.D.Os. who have failed to secure accommodation and those in or near London who can offer it, please communicate without delay with Miss A. S. Stewart, L.D.S., Town Hall, Wembley, Middlesex.

K. C. B. W.

Correspondence

Conservative Fees.—I am relieved to read in "Heard at Hill Street," that the governing factor in negotiations on remuneration is the maintenance of the recommendations of the Spens Committee.

I have maintained my conservative practice, and accept any children who present.

In doing so I consider that I am providing a health service as it was intended to be, for the little section of the public who come under my care.

This leaves no time for producing large numbers of dentures.

I work as long and as hard as I have done for the last thirty years.

I earn between two-thirds and three-quarters of what I earned before the disaster.

My monthly cheque is between £200 and £300. Even if it were £300 every month, it would bring me nowhere near the figure recommended by the Spens Committee.

I hope that any negotiating committee will agree that this type of practice should be encouraged, and that remuneration for it should be improved, if only by removing from it the 10 per cent cut, and bringing children's work into line, for a start.—"1920."

CHANGES OF ADDRESS

Notices of Members' Changes of Address should be addressed to the general office of the Association, and not to the Editor or the Journal Office. To avoid errors, name and both addresses should be written in block letters.

(M. to Y.) ABBOT, B. (Colonel, R.A.D.C.), from c/o Glyn, Mills & Co., Kirkland House, Whitehall, London, S.W.1, to H.Q. Northern Command, 17, Grange Street, York.

(W.) BANNERMAN, S. H., from Royal Army Dental Corps, 157, Kingsway, Chandlers Ford, Hants., to 15, Hollydene, Hythe, Southampton.

(N.C.) BEEDIE, I., from 35, Humbledon Park, to 2, Grange Terrace, Stockton Road, Sunderland.

(S.C. to M.) CLARKE, N. F., from Wyndcott, Birchwood Park Avenue, Swanley, Kent, to 140, Harley Street, London, W.1.

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(S.W. to W.C.) CLEATOR, C. P., from 1, Agincourt Square, Monmouth, to 8, Church Street, Wincanton, Somerset.

(S.C. to N.I.) CURRIE, R. A., from 30, West Street, Chichester, Sussex, to 24, Sheridan Drive, Bangor, N. Ireland.

(E.S. to W.S.) DUNLOP, J., from 29, Bingham Terrace, Portobello, Midlothian, to 15, Ayr Road, Whitecraigs, Glasgow.

(E.C. to M.) FISH, S. F., from 7, Audley Road, Saffron Walden, Essex, to London Hospital Dental School, Turner Street, London, E.1.

(W.) FREEMAN, S. H., from 80, Old Christchurch Road, to 1122, Christchurch Road, Pokesdown Hill, Bournemouth, E.

(N.C.) HOLMAN, A. W., from 11 to 1, Osborne Road, Newcastle-upon-Tyne, 2.

(M. to E.M.) KEYS, W. C., from King's College Hospital, London, S.E.5, to Dunadea, Horsley Woodhouse, Near Derby.

(M.) LIST, R. W., from c/o E. M. A. Sherwood, Esq., 1, Harley Street, London, W.1, to 12, Abercorn Place, St. John's Wood, London, N.W.8.

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(E.M.) MOATE, D. B. (Mrs.), from Pine Garth, Blaby, to 345, Aylestone Road, Leicester.

(E.C. to W.C.) PADGET, P. I. (Squadron Leader, R.A.F.), from Manor House, Hemingford Grey, Hunts., to Devoran Vicarage, Truro, Cornwall.

(N.C.) PALMER, H., from 22, South Crescent, North End, to Sunnybrae, Percy Terrace, Nevilles Cross, Durham City.

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Nominated by: P. D. Cartwright (Miss), J. L. Hardwick, R. J. Smith.

FORTHCOMING MEETINGS AT HEADQUARTERS

April 9	Reorganisation Committee	9.30 a.m.
„ 10	Finance Committee	2.00 p.m.
„ 10	Establishments Committee	7.30 p.m.
„ 19	Council	10.00 a.m.
„ 20	Representative Board.	
„ 21	Representative Board.	

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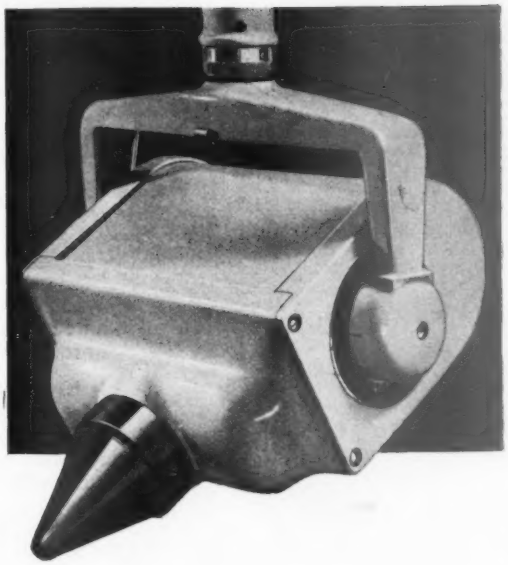

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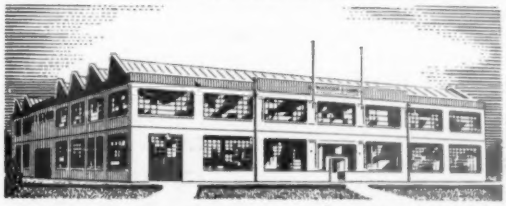

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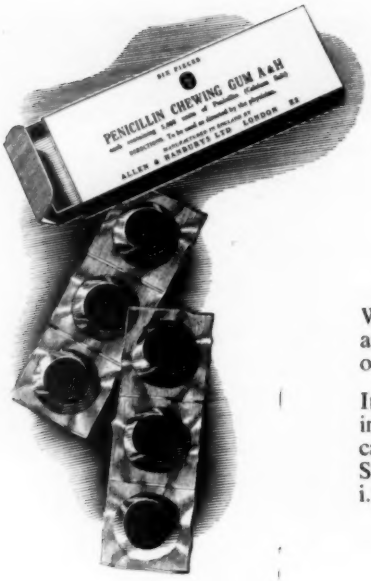

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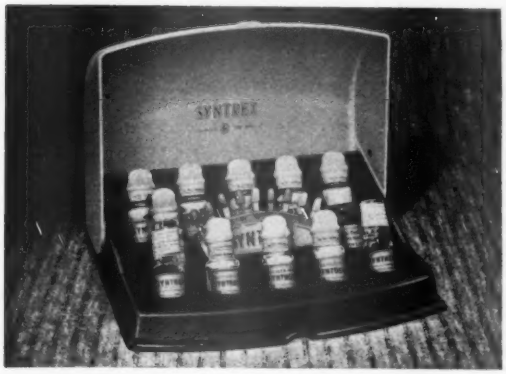

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18 x 6 Anteriors and/or 7 x 16 Posteriors

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Any teeth can be exchanged or credited

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RECENT SURVEYS SHOW—

8 out of 10

American Dentists recommend the

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The excellence of its ingredients and the refreshing, stimulating flavour . . . on these qualities, together with Ipana Dental Care, is based the success of Ipana Toothpaste. 8 out of 10 American Dentists recommend this Ipana way:

1. Between regular visits to the Dentist — the brushing of all tooth surfaces with Ipana toothpaste at least twice a day.
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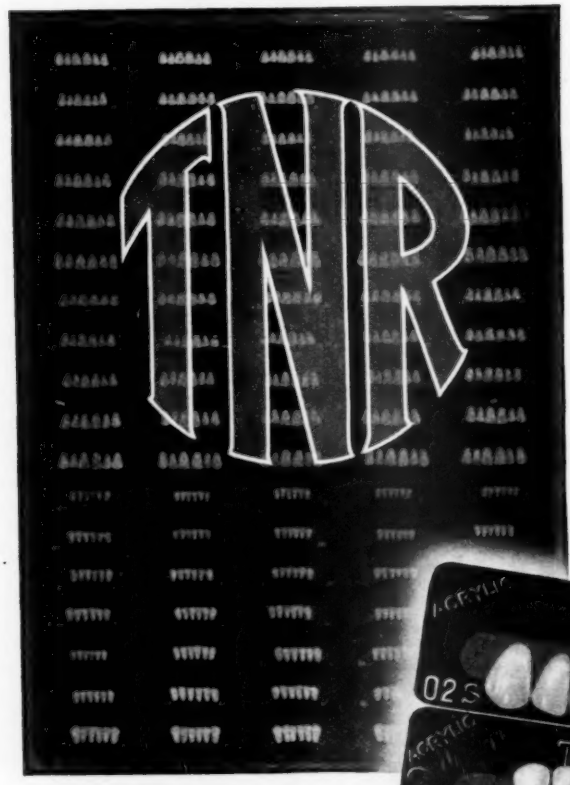

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Sole Wholesale Distributors in Great Britain
HAWLEY and YATES (Dental Depot) LTD. BIRMINGHAM

Manufactured by
The Acrylic Teeth Specialists
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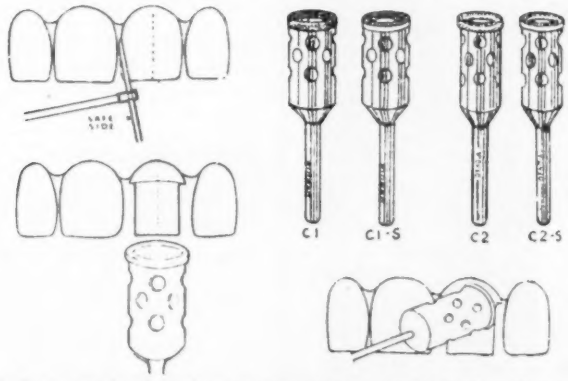

4, 5, 6, 8 mm. with safe or cutting outer edge. Available through your depot.
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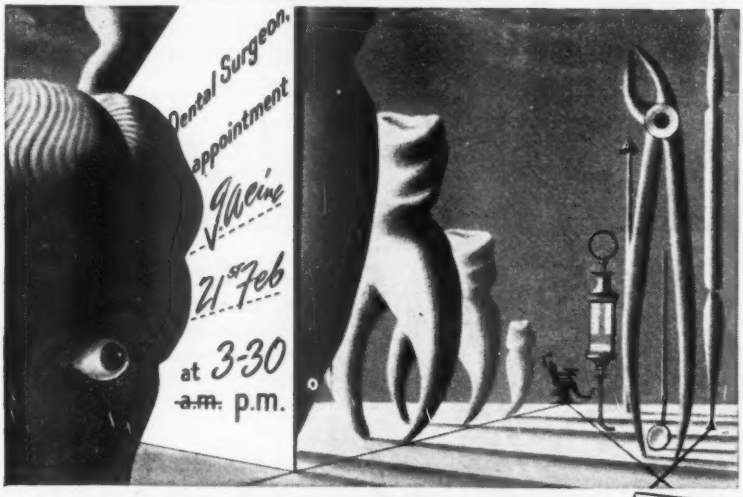

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- ★ **MANGANESE** bronze (strong as steel) frame.
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1000/1 *De Luxe* (takes 4½ × 3½) 66/-
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- ★ **LARGE 4 PART** mouth shaped design for acrylic resins.
- ★ **PHOSPHOR BRONZE** for strength and long life.
- ★ **POLISHED** inside and outside for easy deflasking and cleanliness.

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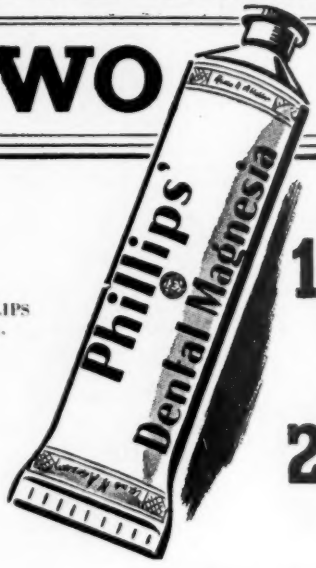
ONE dentifrice TWO defences



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1 CLEANS TEETH THOROUGHLY

Phillips' Dental Magnesia is made to a balanced formula. Its regular use keeps the teeth scrupulously clean and encourages a healthy condition of the oral tissues.

2 COMBATS MOUTH ACIDITY

Phillips' Dental Magnesia is the only toothpaste containing * 'Milk of Magnesia,' which is recognized by the profession as the most effective medium for controlling oral acidity.

* *'Milk of Magnesia' is the trade mark of Phillips' preparation of magnesia.*

New 'VITYPE'
Fine Porcelain TEETH

A WISE CHOICE *for this patient*

An equally wise choice for *all your patients*

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In penicillin therapy

'DISTAQUAINE'
brand

preparations of procaine penicillin offer the following advantages :

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Effective blood levels up to 24 *hours following administration*

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'DISTAQUAINE' *SUSPENSION, vials of* 10 ml. (300,000 *i.u. per* ml.)

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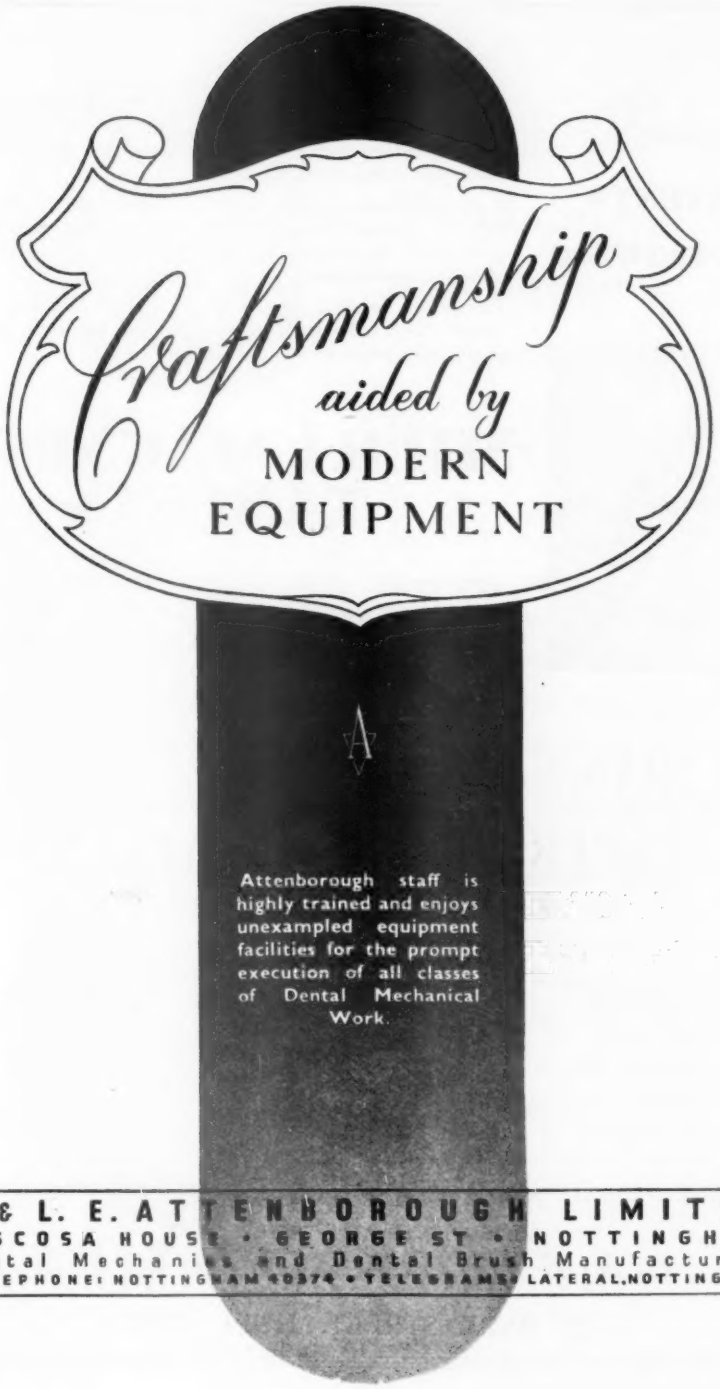
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'MILK of MAGNESIA' TABLETS Regd.

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PER BOX (100 SINGLE SHEETS) 50 × 2 ply
9″ × 10″

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PEACH
BLUE
PALE GREEN

AVAILABLE IN
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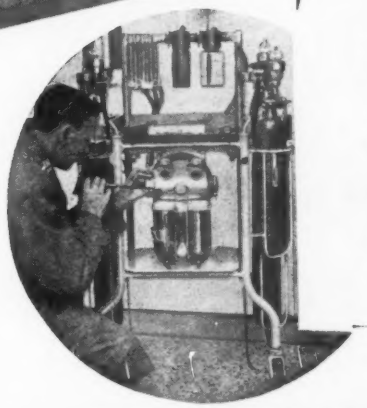

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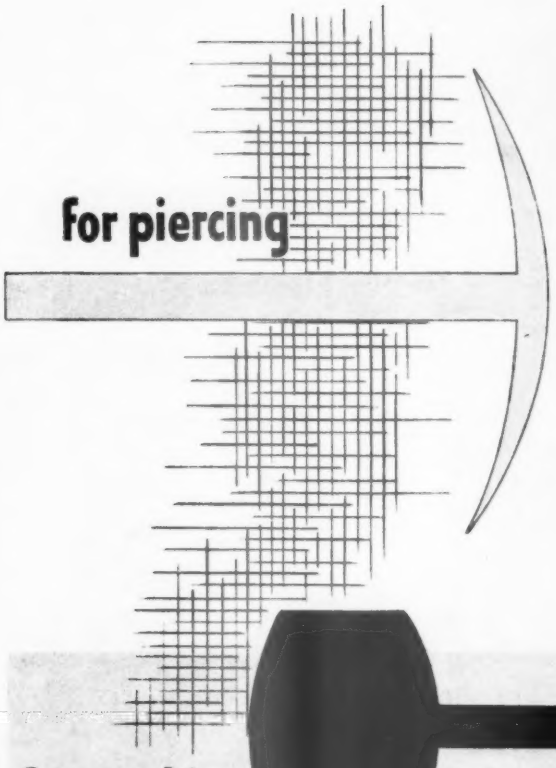

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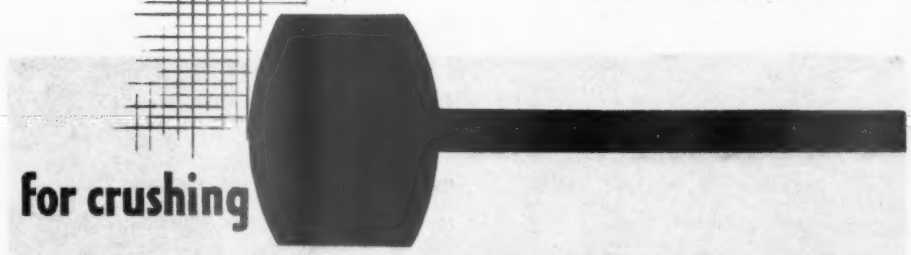

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Manufactured under patented processes for

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